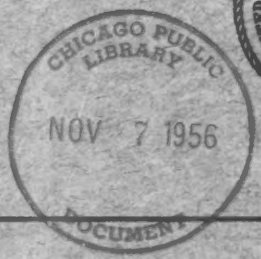
A88.27
8-4

Agricultural Economics RESEARCH



CONTENTS FOR OCTOBER 1956 — *Vol. VIII, No. 4*

		Page
Pricing Eggs at Wholesale in New York City	*Norris T. Pritchard and John O. Gerald*	109
Economic Effects of Progress in Animal Feeding	*Ronald L. Mighell and Orlin J. Scoville*	119
Livestock Estimates and the Search for Further Improvement	*Arnold V. Nordquist*	128
Book Reviews	*Harold F. Breimyer, G. L. Burrows, Harry P. Alpert, Harry C. Trelogan, and Robert H. Masucci*	131

UNITED STATES DEPARTMENT OF AGRICULTURE • Agricultural Marketing Service
Agricultural Research Service

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. • Price 20 cents

Contributors

NORRIS T. PRITCHARD is Head of the Poultry Section, Market Organization and Cost Branch, Marketing Research Division, AMS, and JOHN O. GERALD is an Agricultural Economist in the Market Information and Statistics Section.

RONALD L. MIGHELL is in charge of economic research in feed-livestock relationships, and ORLIN J. SCOVILLE is Head, Farming Efficiency Section, Production Economics Research Branch, ARS. Both have worked in the field of production economics in the Department of Agriculture for many years. Mighell is the author of *American Agriculture, Its Structure and Place in the American Economy*, published by John Wiley and Sons, Inc., last year.

ARNOLD V. NORDQUIST was formerly Chief of Livestock and Poultry Statistics Branch, Agricultural Estimates Division, AMS. Assigned at present to the Agricultural Estimates field office in Lincoln, Nebraska, he will take charge of that office upon retirement of A. E. Anderson in the near future.

HAROLD F. BREIMYER's regular pursuit, from which he departs in a book review in this issue, is outlook work on livestock. He is Head of the Livestock, Fats, and Oils Section, Statistical and Historical Research Branch, Agricultural Economics Division, AMS.

G. L. BURROWS in September became Statistician for the Knolls Atomic Power Laboratory, Schenectady, N. Y. He was formerly a statistical consultant with Statistical Clearance and Standards, AMS.

HARRY P. ALPERT will be remembered for his review of *The Language of Social Research* in our April issue. He is study director for social science in the National Science Foundation.

HARRY C. TRELOGAN, Director, Marketing Research Division, AMS, joined the Department in 1939. He has been affiliated closely with the administration of marketing research in the Department since 1947. Dr. Trelogan is president-elect of the American Farm Economic Association.

ROBERT H. MASUCCI, a past contributor to our Book Reviews, is in the Farm Income Branch, Agricultural Economics Division, AMS.

EDITORS: Charles E. Rogers
James P. Cavin

ASSISTANT EDITORS: Raymond P. Christensen
Winn Finner

AGRICULTURAL ECONOMICS RESEARCH

A Journal of Economic and Statistical Research in the
United States Department of Agriculture and Cooperating Agencies

Volume VIII OCTOBER 1956 Number 4

Pricing Eggs at Wholesale in New York City

By Norris T. Pritchard and John O. Gerald

The effectiveness with which the price-making process functions is of major significance in the marketing of farm products. As developments cause changes in location of trading, number and kinds of buyers and sellers, or other attributes of market structure, their importance to the economy calls for careful analysis to learn what effects they may have on prices and on the process of price determination. In several commodity markets in recent years questions have arisen concerning the adequacy and rapidity with which supply and demand changes were reflected in prevailing prices in those markets. This paper reports part of a study undertaken to learn how prices for eggs are made in a particular market, and the ways by which the pricing process is influenced by such changes as the declining importance of central markets as pricing centers. It examines the pricing of eggs in New York City, together with the significance of New York City prices in interior and other markets. It then attempts to suggest ways by which observed pricing difficulties or shortcomings may be moderated or overcome.

DEPOSITORY

THE QUOTATION SYSTEM of pricing eggs has been used extensively by the egg trade for many decades. The Urner family began regular reporting of New York wholesale prices of eggs and several other farm commodities in 1857. Gradually these price reports came to be used regularly by the egg trade as price quotations.[1] Today, large quantities of eggs in many parts of the United States are traded at prices fixed on the basis of the New York wholesale quotations reported by the Urner-Barry Company.[2] Additional large volumes are priced on the basis of quotations established in other central markets.

The quotation system of pricing has three basic elements.[3] One is the general practice of trading a commodity, such as eggs, on the basis of oral understandings or written agreements that specify the terms of trade, including the particular price quotation and differentials, if any, from it to be used in fixing actual transaction prices. Transfers of eggs usually are made before the quotation has been established and the transfer prices are subject to it.

The second basic element of the system is the quotation. Technically, the quotation is a published statement of market values formulated by

[1] THE PRODUCERS' PRICE-CURRENT. The Urner-Barry Company, Inc., New York. Vol. 77, no. 38, Feb. 9, 1934, p. 18. "Of the various products quoted in 'The Producers' Price-Current,' five commodities—butter, cheese, eggs, dressed poultry, and live poultry—have come to be sold to a considerable extent on the basis of 'The Producers' Price-Current' quotations."

[2] BENJAMIN, E. W., PIERCE, H. C. and TERMOHLEN, W. D. MARKETING POULTRY PRODUCTS, 4th ed. John Wiley and Sons, New York. 1949. pp 322-3.

[3] Among reports that describe quotation systems of pricing farm products are: MANCHESTER, A. C. PRICE MAKING AND PRICE REPORTING IN THE BOSTON EGG MARKET. Harvard Studies in Marketing Farm Products, No. 7-H, Harvard University, 1954; and MARCH, R. W., and HERRMANN, L. F. THE ESTABISHMENT OF CENTRAL MARKET BUTTER PRICES IN CHICAGO AND NEW YORK. Marketing Research Report 53. Production and Marketing Administration, U. S. Dept. of Agri., 1953.

402761—56——1

an experienced market analyst, and, by trade usage, has become widely accepted as the ruling base price for the market.[4] Quotations are intended to reflect base values for specific, well-defined, nonvariable grades and/or sizes of commodities at a constant level of trading, so that usual trading differentials can be applied readily in fixing actual transaction prices.

The third basic element of the system is the mechanism through which prices are publicly registered and adjusted, enabling independent market reporters to obtain essential information from the trade for quoting prices on a regular, recurring basis. This mechanism, the price registering process, is the principal subject of this paper.

Our prime objective is to evaluate tentatively the price-registering process for eggs in New York City. A second objective is to describe aspects of market organization and trading in eggs that are pertinent to the price registering mechanism. The research underlying this paper was undertaken because of widespread confusion about, and criticism of, pricing procedures in New York and several other large central markets.[5] Two of the principal complaints of farmers, country shippers, and others are that (1) central-market price quotations generally are below true market values, and (2) central-market prices fluctuate more frequently and more widely than is necessary for efficiency in marketing eggs.[6]

Although these criticisms imply an underlying distrust of at least one basic element of the quotation pricing system, comparatively few critics appear eager to abandon the system as a whole. They recognize that quotation pricing has important advantages. It probably saves much time and expense in marketing in comparison with such alternative procedures as day-to-day bargaining between widely scattered buyers and sellers. Further, by providing a basing point for determining actual transaction prices, it may have the advantage of reducing the range of price differentials among markets, buyers, and trade channels, and the uncertainties that are an unavoidable part of competitive markets.

Information for this study was obtained principally through interviews with New York egg wholesalers, jobbers, Mercantile Exchange officials, chain store egg buyers, and Federal-State and private market news reporters. Some of the information is from secondary sources.

Theoretical Concepts

In evaluating a price-registering mechanism such as the one for eggs in New York City, a realistic, spatial-temporal model would be useful. Unfortunately, a satisfactory model is not available nor is the basic information necessary for development of one. For the present, therefore, we can only evaluate the mechanism in terms of the highly generalized and less useful principles of accepted pricing theory.

The structure of the central market affects the efficiency of a price registering mechanism and the efficiency of using price quotations. A central, basing-point market should be able to absorb large volumes of different qualities and forms of a commodity and to provide the broad and varied outlets and specialized marketing facilities necessary for their orderly distribution at reasonably stable prices and costs. The market should draw supplies regularly from a large producing area. And it should have a mechanism through which market values at a given level of trading can be registered accurately at regular intervals.

These conditions imply a market structure that facilitates orderly, continuous "clearing of the market," [7] price registering and price formation involving a satisfactory degree of "representative

[4] Although price reports of the Federal-State Market News Service are at times used by traders as market base prices, or quotations, they are not released for this purpose.

[5] For example, see: PRICE SPREADS ON POULTRY AND EGGS. Hearings before the Committee on Agriculture and Forestry, United States Senate, 83d Congress, 2d Session, December 2 and 3, 1954; and SHEPHERD, G. S. "Changes in Structure," YEARBOOK OF AGRICULTURE. U. S. Dept. of Agri., 1954. The research also covers egg markets in Chicago, Los Angeles, and St. Louis. This AMS study complements research under way at the Illinois, Indiana, Missouri, and Ohio Agricultural Experiment Stations dealing with pricing eggs at country points, and similar work in progress at the Pennsylvania and New Jersey Stations.

[6] Similar criticisms have been made of central market prices for butter. For example, see March and Herrmann, op. cit.

[7] MANCHESTER, A. C., op. cit., pp. 4–5; SHEPHERD, G. S., MARKETING FARM PRODUCTS. 3d ed. Iowa State College Press, Ames, 1955; and three articles in YEARBOOK OF AGRICULTURE, 1954, U. S. Dept. of Agri., by DUDDY, E. A., "The Place of Terminal Markets," pp. 37–48; NORTON, L. J., "The Essentials of Good Terminals," pp. 48–52; and SHEPHERD, G. S., "Changes in Structure," pp. 52–59.

trading," flexibility without erratic change, absence of market rigging, and general acceptance of pricing results by the participants.

New York Market Described

To gain perspective, we turn now to a brief description of the organization and trading practices of the New York market for eggs. The market is made up of hundreds of trading firms and several specialized marketing agencies. Some 36 large wholesale-receivers of eggs receive more than 1,000 cases of eggs each, per week, on the average. They received from country shippers, producers and farmers' cooperatives about 5 million cases of eggs in 1954, or about 35–40 percent of estimated shell egg needs of the metropolitan area.

Most of these firms, which do business in a small area on the lower west side of Manhattan, also assemble eggs through collectors at nearby points, or operate nearby and Midwestern country assembly plants. Several firms candle, carton, and distribute eggs, but about 43 percent of the eggs they handle are sold as received to 200 or more jobbers. The jobbers, in turn, perform these functions and serve some of the more than 50,000 retail units and 30,000 eating establishments in the city. Another 29 percent are sold to chain stores, 14 percent to independent retailers, hotels, and institutions, and 4 percent to other wholesalers. About 10 percent are shipped out of the city, primarily to foreign ports.

Five large food-chain organizations in 1954 received an estimated 2 million cases of eggs in 1954, primarily from country assemblers and farmers' cooperatives. Most of these eggs were candled and cartoned in the chains' own warehouses for distribution to their stores. The large chains bought about 15 percent of their needs from city wholesalers.

The remaining needs of the New York metropolitan area were met by eggs that came into the city in several different ways. Most important of these is reported to be direct distribution of eggs to retail stores and to consumers by producers and distributors operating from nearby country points.

Three specialized agencies—the New York Mercantile Exchange, the Urner-Barry Company, and the Federal-State Market News Service—facilitate the marketing and pricing of eggs.

The New York Mercantile Exchange, organized in 1872, provides facilities for public trading in several important agricultural commodities. Membership in the Exchange is open to any person or firm with good business standing. Trading is conducted exclusively by members for their own accounts or as brokers for nonmembers, or both, according to prescribed rules for trading in eggs in several weight and quality classifications. All trading is done by voice before a set of blackboards on which Exchange employees record offers, bids, and sales. All sales are for cash by 2 p. m. of the same day and must bear a certificate of an egg grader of the United States Department of Agriculture as to quality. The Exchange does not quote prices and disclaims any part in setting prices other than providing facilities for public trading.

The Urner-Barry Company, a private firm, collects and analyzes New York wholesale prices of many products, including eggs. This company publishes quotations daily in its "Producers' Price-Current." Urner-Barry price quotations on eggs are based primarily on results of trading on the New York Mercantile Exchange; a quotation represents the best judgment of the firm's egg specialist of the market base prices at the time it is released. These are the quotations to which traders refer when they speak of "today's market." Quotations are distributed by commercial news wire services at about 11 a. m. each trading day, but not by the wire services of the Associated Press, the United Press, or the International News Service.

The Federal-State Market News Service issues daily reports of egg prices and receipts, and related marketing information for eggs and other products, by mimeographed report, private telegraph, a leased wire system, and the national news wire services, AP, UP, and INS. The price reports are based on information gathered in much the same manner and from many of the same sources as the Urner-Barry price quotations. However, the purposes of the two reporters differ in at least one important respect and this difference affects their operating procedures. The aim of the Urner-Barry reporter is to release a quotation for each of several weight and quality classifications of eggs. The Market News reporter attempts to report prices for all wholesale sales he can discover wherein quality and other factors are

reasonably comparable. As a result, the two price reports are essentially similar, with one expressed as a single price and the other as a range of prices.[8]

In at least one respect, egg handlers of the various types in the city follow similar trading practices in that they all use the quotation pricing system in establishing actual transaction prices. The usual terms of trade established by oral and written agreements[9] between the larger wholesale-receivers and chain stores on the one hand, and their country suppliers on the other appear to be about as follows:

Sales are made f. o. b. receivers' and chain store warehouses. Eggs may be delivered in either new or good quality used cases which are usually returned to shippers free, or at an agreed price, say 15 or 30 cents per case. Prices are the Urner-Barry quotation for a given grade and size of eggs, day of arrival, plus or minus an agreed-upon differential. Most actual prices paid to shippers appear to be in the range of 1 cent below the quotation to 1½ cents above, depending on quality, services, and other conditions. A cash settlement usually is made on the day of arrival or the day following. The grade of eggs is seldom determined by a third party. Most of the eggs that arrive in New York are not candled for quality by wholesalers except on a sample basis. Disputes between buyers and sellers on quality and other matters are usually handled by informal negotiation.

Agreements between receivers and country shippers generally do not specify the volumes of eggs to be delivered in any given time period. They simply establish the terms of trade for those deliveries which will be made. Sellers are not generally required to deliver their entire volume to a single receiver nor is the receiver required to purchase all of his receipts from a single shipper. But, it is apparently customary for the larger wholesale-receivers to accept any volumes of eggs country shippers wish to ship them. The chain stores, on the other hand, appear to have the policy of restricting purchases, even from regular suppliers, to their approximate needs as these are determined by their retail outlets.

[8] The Federal-State Market News reporter also learns of occasional changes in the relationship between prices established in street trading and the quotations, and therefore reports information in addition to the range of trading that occurs in the process of registering base prices. Changes in the premium-discount structure frequently precede changes in quotations.

[9] Many of the understandings between city receivers and country shippers are highly informal, and the term "agreements" is not intended to imply arrangements of a formal nature only. Written contracts between receivers and shippers are rare.

Registering and Quoting Base Prices

Now let us see how these organizations and practices fit together in registering base egg prices on a more-or-less typical trading day. In the morning, the egg market reporter of the Urner-Barry Company calls on wholesalers in the Manhattan market. In these personal contacts he picks up little information on prices because nearly all street trading in bulk-packaged, nonstandardized eggs is conducted on the basis of his quotation established the previous day. He does, however, learn how the traders feel about the current market situation and how readily or slowly eggs are moving into distributive channels in relation to actual and anticipated receipts. To this collection of facts, opinions, and observations, he adds his gleanings of the previous afternoon from telephone conversations with egg buyers in the New York City area but outside the Manhattan market. Information is also regularly obtained on conditions prevailing in other markets and supply areas.

Shortly before 10:30 a. m., when the 15-minute spot call for eggs opens daily, the reporter arrives on the trading floor of the New York Mercantile Exchange. There, a number of members of the Exchange already have assembled to await the opening of the spot call, to engage in friendly conversation, or to make a few private sales of eggs. As many as 75 members may be present at the spot call, but usually the number is substantially less. The majority are egg handlers in the Manhattan market. Many attend the daily spot call primarily to observe trading. Several have a definite policy of nonparticipation, and many others usually are not prepared to sell eggs. Typically, only a dozen or so traders are active on any one day, and only a handful participate regularly in trading on the spot call.[10]

[10] In November 1955, a total of 45 different individuals, of whom 38 are egg wholesalers, traded eggs on the Exchange one or more days each, but only 6 made offers, bids, purchases, or sales on 12 or more of the 20 trading days during the month. Only 7 additional persons were active on 8 to 11 days; 13 were active on 4 to 7 days; and 19 traded on only 1 to 3 days.

The large food chains and meatpacking and dairy companies do not trade openly on the Exchange, but some may trade through brokers. Few, if any, small jobbers take part. Only one producers' association is active more than occasionally on the spot call. In a practical sense therefore, trading in cash eggs on the New York Mercantile Exchange is carried on by a small, informal group of traders, mostly Manhattan wholesale-receivers of eggs, and it acts as a leader in the registering of base prices.

As a rule, transactions on the Exchange involve lots of eggs of the minimum quantities permitted. These are 25 cases of nearby eggs and 50 cases of all other (principally midwestern) eggs. Lots of more than 100 cases are seldom traded, but bids and offers for larger lots are relatively common. The combined effect of the small number of active traders and the general practice of buying and selling essentially token quantities of eggs is to hold total trading volumes to extremely low levels, usually less than 1 percent of receipts in the metropolitan area.[11]

A few minutes after the close of the daily spot call, the reporter for the Urner-Barry Company announces his egg price quotations, which become the new market base prices until the next day's Exchange trading.[12] Technically, these quotations are only the opinion of an expert market analyst of the market base prices at the moment of their release. As a practical matter, however, they are heavily influenced by results of Exchange trading. Quotations are based on a careful evaluation of spot call activity and information from other sources. The reporter may ignore unfulfilled bids and offers and other information he believes to be irrelevant or misleading, but he rarely can ignore closing prices of an active spot call, because these represent trade action, not opinions.[13]

[11] For example in April 1954, 109 transactions were made on the 22 spot calls involving about 9,000 cases of eggs in 13 different quality and size classifications. These sales were about 0.7 percent of estimated April receipts of eggs in the New York metropolitan area. In addition, 448 unfilled offers and bids were recorded on the Exchange egg boards.

[12] Egg price reports of the Federal-State Market News Service in New York are released at noon of each trading day.

[13] Even unfulfilled bids and offers may not always be ignored if the bid is above the previous day's quotation or the offer is below it. In fact, in the absence of actual trades on the spot call unfulfilled bids and offers may be the only available public expressions of trade sentiment.

Evaluation of Price Registering Mechanism

The evaluation of the price registering mechanism given below is admittedly preliminary and incomplete. It is based largely on consideration of selected aspects of market structure and practice. Six aspects are considered: (1) The nature of firms that actively participate in registering market base prices; (2) the level of trading reflected by activity on the New York Mercantile Exchange spot call; (3) the primary purpose of trading on the Exchange; (4) the tendency toward price instability; (5) small volumes of trading on the Exchange; and (6) the suitability of the quotations for use in pricing eggs at various levels of trading (a) in New York, and (b) in other markets.

Few Trading Firms Participate

The relatively few firms that participate in the registering of egg prices in New York City represent primarily one major segment of the total metropolitan area market. They constitute a link in the traditional and declining marketing channel of farmer-country shipper-city wholesaler-jobber-and-independent retailer. They also supply a small portion of the needs of the chain stores and, at times, act as brokers of shell eggs. About 35 to 40 percent of the eggs received in the metropolitan area pass through their hands.[14] Their receipts are an even much smaller percentage in the larger market in which New York egg quotations are said to have direct effects on cash egg prices to farmers and others. Furthermore, about 90 percent of their sales are made to buyers within the city—another 8 percent go to foreign countries. Most of their receipts originate in five States—New York, New Jersey, Pennsylvania, Iowa, and Minnesota.

Firms that use the more direct marketing channels and handle most of the eggs received in the city do not participate directly in price registering activities. Their influence on market base prices is indirect. It probably is felt through their purchasing and distribution activities, including effects of these on receipts and sales of the firms active in Exchange trading. The large chains may exert some additional indirect influence on market base prices through their in-

[14] The Federal-State Market News reporter in New York has indicated that the proportion of eggs received in the metropolitan area by traders active on the Exchange more than only occasionally may be much less than 35 percent.

fluence on retail prices and sales of eggs. The potency of indirect influences is not known, and the extent of the time lags involved is uncertain.

Thus, the traders who actively participate in price registered are the dominant group in the Manhattan market. They are also alert to the ever-changing competitive forces between them and other important segments of the market for eggs in the city. These forces directly or indirectly affect the volumes handled by the group. In other words, lack of "representativeness" probably is not an inherent defect of the price-registering mechanism itself. The problem may arise from improper use of its results, the quotations, when firms outside the New York metropolitan area use these quotations to determine prices for eggs which do not enter the New York market.

Level of Trading

The New York spot call for eggs often has been viewed as the wholesale level of trading in the city. At one time in the history of the New York egg market, this interpretation may have been essentially correct.[15]

But the growth of quotation-pricing arrangements and other trading developments have almost eliminated this type of trading activity on the Exchange. Receivers generally find it less costly, more convenient, and otherwise more efficient to buy under quotation-pricing agreements for most of their needs and to fill additional needs by telephone. Further, when trading on the Exchange, both buyers and sellers incur costs in addition to regular costs of receiving (buying) and distributing (selling) eggs under standing agreements or by telephone contact. These costs are both direct and indirect. Such costs as brokerage, Exchange, and quality inspection fees are direct and measurable. Indirect and largely nonmeasurable are such costs as time spent in Exchange trading, uncertainties for sellers that available stocks of eggs will meet Exchange specifications, and uncertainties for buyers that the eggs bought on the Exchange will have the quality characteristics of eggs bought through regular channels.

Similar doubts may be expressed concerning the extent to which the trading reflects market values at the city receiver buying levels. At what level is trading on the spot call, and what is its purpose?

Under present marketing practices, it appears that spot call trading does not necessarily register market values for either given recognized level of street trading, wholesale selling, or trucklot receiving. The quotations established on the basis of spot call trading appear to be between actual transaction prices for these trading levels, and the trade regularly uses the quotations as base prices for both buying and selling.[16] As a consequence, base prices need not reflect market values of a particular level of trading in order to provide means of arriving at prices for a particular level. However, it is necessary that both trade understanding of the sense of the quotations and trade practices in using them remain essentially unchanged from day to day. It is desirable that the egg trade have available current information on the structure of premiums and discounts. The Federal-State Market News Service now endeavors to provide such information.

Purpose of Trading

Since prevailing market practice requires quotations for use as market base prices, there is a compelling need for a mechanism, such as trading on the Mercantile Exchange, through which current quotations can be established. In a practical, though not technical sense, the primary purpose of Exchange trading in cash eggs is the registering of these market base prices. In daily spot call

[15] "In determining the quotations printed in 'The Producers' Price-Current,' it is the sole object of the reporters to represent the full selling value of all qualities commonly obtainable as indicated by wholesale transactions from first hands, in which the price terms are agreed to by barter and without reference to the quotation. There are sometimes certain particular marks of goods that are engaged by regular buyers at a premium over the quotation. But such sales do not really represent the actual value of the goods on the open market, for the premium represents simply the value of regular service with a known quality of goods, and the saving of the buyer's time in shopping the market. The price at which the goods can be bought by a buyer going from store to store to seek them, or the price at which holders can sell on the open market the quantity of goods imperatively offered, are the prices at which the reporter aims to fix his quotations." Urner-Barry Company, *op. cit.*, p. 18. This policy was stated in 1907. However, it appears that the firm now recognizes that in the case of eggs it in effect quotes "base values" rather than actual values.

[16] The price reports of the Federal-State Market News Service usually include the quotations within reported ranges of wholesale selling prices.

sessions, traders, by offering and bidding for eggs, test the reactions and sentiment of the Manhattan trade as a group to particular market and price situations to see if adjustments may be needed in existing quotations.

These adjustments may consist of changes in the general level of base prices or of changes in relationships among the quotations for the different classifications of eggs. In either case, trading appears to be conducted with a view to arriving at a set of quotations which, when adjusted by the prevailing complex structure of premiums and discounts, will provide the actual transaction prices that at the moment appear most likely to provide a satisfactory movement of eggs through regular outlets without sacrifice of usual trading margins.

Trading may occasionally be influenced by other factors. One is the desire of New York traders to avoid losses or to secure gains on floor stocks. But motives of this sort probably are not usually as strong as the desire to secure regular trading margins on a large volume of eggs.

To conclude from the foregoing that this price-registering mechanism for eggs regularly understates true market values for eggs, as has been charged, is beside the point. The quotations are base prices. They usually are not actual transaction prices. The significance of this may not generally be understood, and if that is true an educational job is needed. But an important question for further research is whether the actual transaction prices established under this quotation pricing system promote efficiency in the pricing and movement of eggs in marketing channels.

Price Instability

One of the major complaints of farmers and others against the pricing system for eggs in New York and other central-market cities is that prices in these markets fluctuate more frequently and widely than is necessary for efficiency in marketing. The absence of satisfactory criteria for evaluating the reasonableness of actual price variations appears to make analysis of daily price data unrewarding. Despite this lack, some valuable insights on this problem may be achieved through study of the structure of the New York market.

Our analysis indicates that certain characteristics of the organization and functioning of the market may, though not necessarily, create price instability. Price-registering activities, as previously indicated, are conducted largely by traders who represent only one major segment of the market, the larger independent wholesale-receivers. This is the segment of traders who have the least stable operating volumes.

Wholesalers' receipts of eggs from country points vary from day to day and week to week several times as much as do receipts of food chains, and substantially more than estimated total receipts in the city.[17] Many wholesalers claim that by necessity, they constitute the "surplus" segment of the market. As a matter of usual practice they stand ready at all times to receive eggs from any seller or to deliver eggs to any buyer at a stated price. In contrast, many other buyers follow the practice of restricting purchases to estimated immediate needs of regular outlets. As a consequence, wholesale-receivers frequently receive eggs from shippers only when these firms cannot market supplies readily through regular outlets at usual differentials. Conversely, wholesalers are called upon by some chain stores and other buyers only when regular suppliers cannot fill their needs at usual differentials.[18]

Furthermore, it is doubtful that this segment of the market can be expected to reduce these variations in operating volumes materially. Hence, some price instability is to be expected. As a

[17] Weekly receipts of eggs in 1954 of the 12 large New York wholesalers interviewed ranged from 50 to 164 percent of average weekly receipts. Weekly purchases of 5 major food chains ranged from 85 to 113 percent of average weekly purchases and for 9 smaller receivers (jobbers) from 90 to 124 percent of their average. The 1954 national disappearance of shell eggs ranged monthly from 89 to 111 percent of average.

[18] In spite of possible adverse effects of these divergent buying practices and concentration of supply variations into one segment of the total market on pricing efficiency, it is not clear that they adversely affect the overall efficiency of the marketing process. The present structure of the market may possibly be, on balance, more efficient because of these conditions. For example, differences in the derived supply and demand curves confronting different types of handlers may justify divergent buying and inventory policies. And firms carrying on candling and cartoning operations probably would experience higher operating costs if they could not restrict variations in purchases to a relatively narrow range. Somewhat similar considerations may also apply to outside handlers who use the New York market only occasionally as a means of bringing purchases and sales into balance when efforts to do this through regular channels fail.

group, New York wholesalers no longer have as broad outlets as they had several decades ago. Most of their sales are made within the metropolitan area and a sizable proportion probably can be considered as committed in advance for more-or-less regular customers.[19] Wholesalers generally appear unwilling or unable to carry inventories large enough to serve as adequate buffer stocks which would tend to dampen fluctuations in prices. The typical firm endeavors to hold inventories at all times to minimum operating levels in order to reduce losses from quality and price declines.

Probably few of these firms have financial reserves in excess of those needed for credit extension to buyers and similar purposes, and are not in a position to finance large inventory accumulations. Also, generally low operating margins of about 2 to 3 percent of gross sales do not encourage acceptance of the heavy risks of owning large inventories.[20] Thus, their general policy of seeking the price flexibility necessary to "clear the market" daily is understandable.

Trading Volumes

Trading on the New York Mercantile Exchange usually involves small volumes of eggs. This has raised questions regarding the adequacy of this "sample" of transactions for accurate registering of market base prices. The usual small trading volumes, it is charged, increase the likelihood of extreme fluctuations and manipulation of prices. Despite some logic in these arguments, it does not appear possible either to prove or to disprove them on the basis of existing information.

New York traders generally argue that large volumes are not essential to achieve the primary purpose of trading, which is to discover and register market base prices; and, surpluses and deficits in supplies are usually adjusted by street trading more economically than by Exchange trading. A few lots of 25 cases each are normally adequate to test trade reactions to specific price situations, and to obtain the relatively small adjustments usually needed in current quotations. Therefore, why take the time and incur the extra costs of trading a truckload of eggs?[21] Furthermore, the complete absence of activity on the spot call on a particular day is not necessarily undesirable; it may simply indicate that the trade generally feels no need for adjustments in prevailing quotations. Under such conditions, the absence of trading may be more meaningful and no less inaccurate in practical effect than sales of hundreds of cases on the spot call.

Granting some logic in the argument that small numbers of traders and small volumes of trading increase probabilities of price manipulation, the probabilities have been exaggerated by critics of the present system of pricing eggs. According to many daily observers of the spot call, a bold and skillful trader may be able to manipulate closing prices on the Exchange for one or two days, but this activity is subject to serious limitations. The Exchange penalizes members found guilty of improper trading. Even greater penalties may be exacted by the community of traders by less formal and more rapid means. A trader who attempts to manipulate prices in his favor, if he misjudges market conditions and trade sentiment, may quickly find himself buying or selling large volumes of eggs at a loss. Reporters also are watchful for attempts at manipulation and can refuse to "quote" a market that, in their opinion, is "rigged." In short, although the incentives for manipulation are frequently present, deterrents are potent. These deterrents probably would be stronger, however, in a broader market.

Use of New York Quotations

Much of this paper has dealt directly or indirectly with considerations pertinent to the question of the suitability of New York egg quotations in pricing eggs at various levels of trading in New York and in other markets. Our analysis has led to several somewhat different, but not contradictory, conclusions, which may be modified as additional information becomes available. In this connection, current studies of pricing practices of country egg assemblers and handlers may prove particularly valuable.

In general, the question of the suitability of New

[19] A few wholesalers conduct brokerage operations through which they at times are able to divert "receipts" to other markets or into storage.

[20] Several wholesalers indicated that hedging operations are not adequate protection against inventory losses.

[21] Given the usually small volumes of trading any large increase in trading activity may have unsettling effects on the market, particularly if the trading is through brokers.

York egg quotations in pricing eggs under long-term quotation pricing agreements appears to depend largely on the closeness, in the economic sense, of the particular transactions involved to the Manhattan egg market. Within this market itself the quotations and the methods of establishing them appear to be on the whole satisfactory. Traders active in the price registering process handle nearly all of the eggs that pass through the Manhattan market. They are alert to competitive forces, highly sensitive to prices, and generally well informed. Although they trade only token quantities of eggs on the Exchange, they regularly back up these public expressions of market values with street and other trading of relatively large volumes of eggs on the basis of the quotations determined, in the main, by their own trading activities on the Exchange. In short, these firms are the focal points through which Manhattan buying and widely scattered selling interests meet.

As the marketing area under consideration is broadened, however, the suitability of New York egg quotations in fixing actual transaction prices under long-term quotation pricing agreements becomes doubtful. The primary causes of this are to be found in the national production and marketing structure for eggs which has undergone marked changes over the past several decades.

Among these changes are: (1) Relative increases in egg production in areas near major consuming centers; (2) sharp declines in seasonal variations in production nationally; and, (3) substantial decentralization in marketing as the result of development of modern techniques of transportation, communication, and distribution. Therefore, central market egg quotations are not as appropriate as in earlier years for price formation in many consumer markets and producing areas. Egg trading and price formation now involve far wider areas of action than the central markets.

Although the central market quotations undoubtedly will continue to be influential in price formation, their relative influence seems destined to decline still further. An expansion of reporting of egg movements and prices outside the central markets, especially in the major egg-producing areas, might hasten this decline. Many country shippers and egg handlers throughout the United States may still be using New York egg quotations and price reports in pricing eggs which do not enter that market simply because these quotations and reports are the least unsatisfactory of the relatively small number of available alternative sources of price information. But it is by no means certain that an expansion of market information on eggs would have effects similar to those generally accredited to the decentralization and expansion of market information on such commodities as hogs and commercial broilers.

Possible Future Research

Before research in this area of egg pricing is completed it would be desirable to examine several possible means of improving egg-pricing methods. Some aspects of the problem that merit study are: (1) Means of broadening the base of exchange trading; (2) methods of reducing fluctuations in receipts, and/or channels, of eggs in central market cities; (3) expansion of coverage of market news information; (4) altering the basis of the quotations used in the quotation pricing system; and (5) securing greater comparability among markets in information on prices and market conditions. Study of these and other possible alternatives might reveal them to be impracticable or otherwise unsatisfactory, but they should all be accorded serious consideration.

Increase Exchange trading.—The base of trading in cash eggs on the Exchange might be broadened by expanding the present small volume of trading, and perhaps also the number and types of active traders. For example, active trading by more representatives of country shippers and producers of eggs would broaden the range of trade interests in the price-discovery process.[22] Use of modern communication methods, not even excluding a closed television circuit, might permit traders at considerable distances from New York to participate directly in this process. Free inspection service for all traders who give notice of intention to appear on the spot call might induce more active participation in daily Exchange trad-

[22] One possible disadvantage of this proposal is that it might cause the quotation to vary considerably from time to time in the level of trading it represents. Another possible disadvantage is that the presence of several large, well financed egg traders might discourage participation by New York wholesalers and even decrease rather than increase the range of trading interests and trading volumes.

ing by eliminating the principal costs of being prepared to sell. Reductions in this and other costs of trading on the Exchange might induce an expansion of trading accompanied by some improvement in the accuracy and stability of prices and quotations.

Reduce variations in volumes of receipts.—Means may be found for reducing the large variations of receipts of eggs by wholesale receivers in the New York market. Country shippers perhaps could make more strenuous efforts to direct the flow of eggs among markets and types of egg receivers so that gluts and shortages would be minimized. These abnormal marketing conditions in New York at times have highly disruptive effects on trade channels, location of stocks, and possibly prices. The practical difficulties involved in such operations probably would be great, and perhaps even insurmountable, but the potential benefits from success seem great enough to warrant their study.

Expand Market News Services.—Expansion of the market coverage of the Federal-State Market News Services and/or other information programs might improve price-making processes. Reports on country point prices and collections of eggs in all major egg producing areas probably would be most beneficial. Several proposals to expand the Federal-State Market News Service coverage of egg prices and marketings are under study, including among others, prices paid by retailers in New York City and other large cities and prices paid farmers in major producing areas. The Marketing Research Division also has initiated a research project which, it is hoped, will result in development of a national weekly report of egg movements from farms to first buyers.

Alter the bases of quotations.—Modification of the quotation pricing system is a subject for further possible research. For example, producers shipping eggs to Los Angeles distributors are paid at a fixed differential under the prices paid by retailers as reported by the Federal-State Market News Service. Research, of course, would be needed to learn whether any such pricing procedure could operate successfully in other cities where egg-marketing conditions and methods, and size of firms, differ materially from those prevailing in the Los Angeles area. Still other price bases, such as egg futures prices, might be considered.

Increase comparability of market reports.—More uniformity in reporting with respect to grades of eggs and levels of trading would be helpful to all who use the reports. The extent of the confusion and marketing errors resulting from existing variability in reporting practices, although unknown, may be considerable. This, of course, is a difficult problem which the Market News Service cannot solve without assistance from the industry and probably from research and extension workers in egg marketing as well.

Finally, looking into the future, we might consider some powerful forces that have produced and will continue to produce important changes in methods of egg marketing and egg pricing. The traditional system of marketing eggs from farmers through country assemblers, city wholesalers, jobbers, and retailers has been declining in importance for many years as new and more efficient marketing methods have developed and as commercial egg production has increased in importance relative to total production. At the same time that numbers of small retailers, small jobbers, and small wholesalers in the city have been reduced, numbers of country assemblers and egg producers have declined. The average size of producing and marketing organizations has greatly increased. Most signs point to continuance of these trends. Direct negotiation of terms of sale of large quantities becomes less costly per unit of product. More such transactions, therefore, may develop. We have already witnessed the start of this trend in pricing ready-to-cook poultry and several other products, and it may develop in eggs, too. This possibility deserves careful watching. It could even "solve" our problems of quotation pricing by the simple device of eliminating this pricing method. Pricing problems would still remain. Whether they would be more or less susceptible to solution than the present ones remains to be seen.

Economic Effects of Progress in Animal Feeding

By Ronald L. Mighell and Orlin J. Scoville

Technological progress in animal production in the last 30 years has been substantial in some ways, negligible in others. On the one hand, livestock production per animal unit of breeding stock has shown gains of the same order as those in crop production per acre of land. But on the other hand, aggregate livestock production per unit of feed has shown little improvement. Progress has followed, in the main, the path of increased physical efficiency per head rather than that of increased physical efficiency in feed conversion. What are the reasons for this disparity in rates of improvement in animal production per head and per unit of feed? Is it real? If so, will it persist? Why is it that significant advances in animal breeding, nutrition, and sanitation are not reflected in available data on feed conversion? These and many other related questions need to be answered. In this paper the authors analyze several aspects of economic effects of the apparent lag in feeding efficiency.

IMPROVEMENTS IN LIVESTOCK production over the last 30 years have been noteworthy. But they do not appear to have materially affected the average level of feed conversion, at least until very recently (table 1). Several reasons may be cited for this.

Improvements that increase the number of pigs saved per sow, the number of chicks hatched per hen, or the number of calves per cow are significant in building up the scale of operations and in making better use of labor, fixed capital, and overhead, but they do not save much feed.

Mechanical incubation of eggs, for example, has vastly increased chicks hatched per hen without much direct effect on feed consumption per chicken raised. Increases in milk production per cow and in egg production per hen have been achieved through developing cows and hens with higher productive capacity and by feeding them more and better rations. But greater production has been achieved partly at the expense of higher maintenance needed with larger-sized animals, and partly by feeding farther out on the curve of diminishing physical returns. Technically improved rations have made it profitable to feed in this way.

These factors have had a tendency to reduce average output per unit of feed. The changes that have taken place are complex and differ considerably between classes of livestock. For example, as between milk and egg production different results may follow from what apparently are the same kinds of changes in feeding. A milk cow that is fed below her economic capacity—that is, at a level less than would be marginally most profitable—may when fed farther out on the curve of diminishing returns show a *lower average* output per unit of feed. A hen fed similarly will respond with a *higher* average output per unit of feed. This apparent anomaly is explained by the fact that the maintenance portion of the ration is relatively much larger for the hen than for the cow (*3*).[1]

Still another type of difficulty in measuring changes in feed conversion efficiency over time is represented by changes in the character of the product. This takes the simplest form when the size of the unit of measurement is subject to change. The average dozen of eggs, for example, is perhaps an ounce (about 4 percent) heavier now than 20 years ago. The average fat content of milk is less than formerly. Even more complex changes are found in meat production as average market age and quality of output change over time. A higher proportion of beef cattle is now grain fattened; and as fattening beef cattle consume on the average more grain per pound of meat produced than do other meat animals, this tends to reduce the aggregate rate of feed conversion.

Difficulties also arise in measuring changes in quality and quantity of feed consumed by livestock. The protein content of hay and pasture forage has increased appreciably in the last generation, while the protein content of corn has de-

[1] References in parentheses and italics refer to literature cited at end of paper.

TABLE 1.—*Crop production per acre, livestock production per breeding unit, and livestock production per ton of feed 1925–29 to 1950–54* [1]

[1947–49=100]

Year	Crop production per acre	Livestock production per breeding unit	Livestock production per ton of feed
	Percent	*Percent*	*Percent*
1925–29	81	81	97
1930–34	73	83	100
1935–39	80	88	101
1940–44	93	95	98
1945–49	99	98	97
1950–54	101	108	104

[1] Computed from data in ARS report "Changes in Farm Production and Efficiency," (7) and other data from Production Economics Research Branch, ARS. Data do not include workstock and feed consumed by workstock. Feed data are total feed units of all feeds.

creased from about 7.0 to 6.5 percent. Thirty years ago poultry obtained a considerable part of their feed by picking up insects and waste grain around the farmstead. This feed never entered into official estimates of feed production; it made poultry appear to be more efficient converters of feed than they actually were. Allowance has been made in feed consumption studies for these secular changes but it may not be entirely accurate.

The index of livestock production per ton of feed in table 1 reflects the effects of a number of diverse and sometimes contradictory changes in livestock production processes. There are many difficulties in obtaining accurate data and in the measurement of the changes that have taken place. The short-run fluctuations in output per ton of feed within the 30-year period are probably not significant although the apparent tendency for feeding efficiency to increase in very recent years is consistent with current technological developments. Also, there appears to have been some upward trend in feed efficiency in the years prior to the period covered by table 1 (*1*).

Feed Efficiency Varies by Kind of Livestock

The different kinds of livestock vary widely in the physical efficiency with which they convert feed into product, as shown in table 2 and figure 1 for four kinds of meat producing animals. Other important kinds of meat animals are omitted because of the difficulty of allowing for feed consumed in producing such joint products as meat and wool and meat and milk. On the chart, the shorter the bar, the more efficient is the class of animal as a feed converter.

TABLE 2.—*Feed conversion efficiency, by kind of livestock, 1949–53* [1]

Kind of livestock	Feed units consumed per—			
	100 pounds liveweight	100 pounds meat and fat, excluding bone	100,000 calories food energy	Pound of protein
	Including pasture			
Hogs	515	819	324	9
Cattle and calves	952	2, 186	1, 552	13
Broilers [2]	359	674	834	3
Turkeys	543	885	740	4
	Excluding pasture			
Hogs	490	779	309	9
Cattle and calves	577	1, 325	940	8
Broilers [2]	359	674	884	3
Turkeys	518	828	706	4

[1] Data subject to revision, Production Economics Research Branch, Agricultural Research Service, U. S. Department of Agriculture.

[2] Broiler data do not include feed consumed in producing "hatching" eggs. Correction for this would add about 5 percent to the data shown.

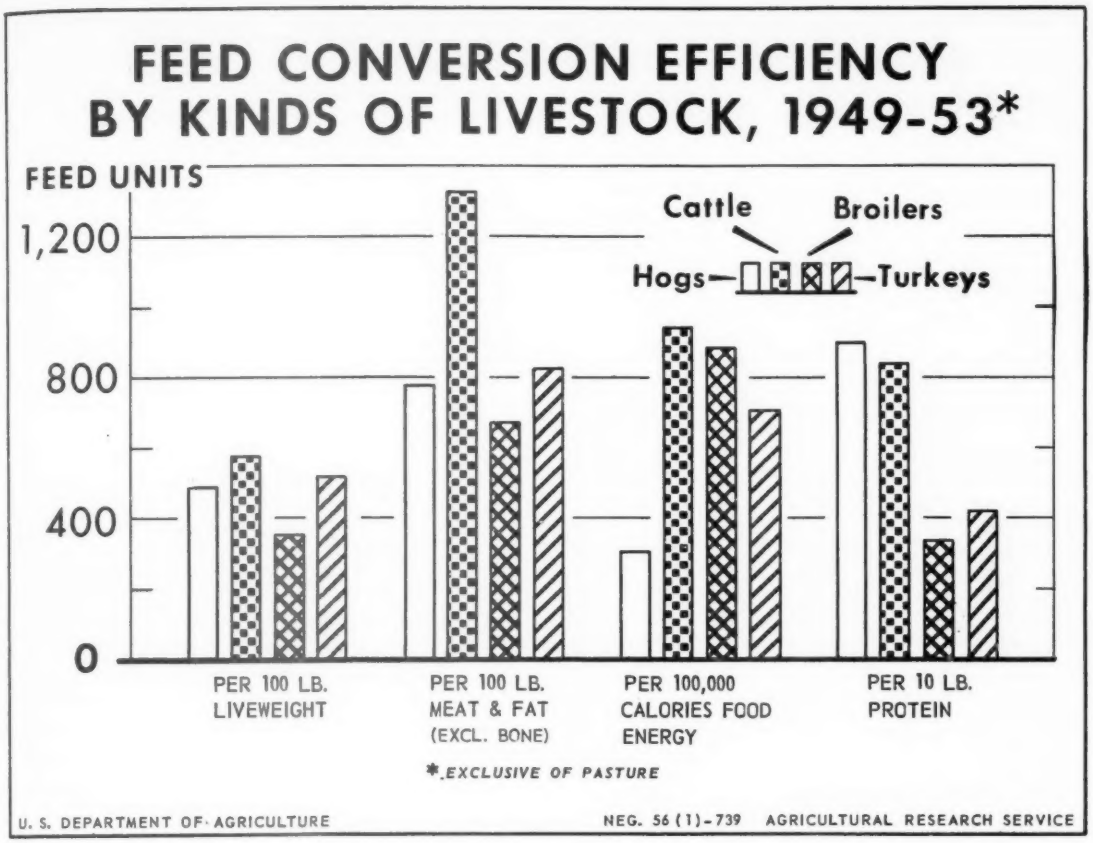


Figure 1

By any of the measures used, beef cattle consume more feed units per unit of product than any of the other three kinds of meat animals. If pasture inputs are excluded, they take a little less feed per pound of protein produced than do hogs. Hogs consume the smallest quantity of feed per calorie of food energy produced. Except for production of food energy, broilers take the smallest quantity of feed per unit of production, even if pasture inputs are excluded. Turkeys are in an intermediate position; they use somewhat more feed units per unit of production than hogs, except in production of protein. These recent estimates reflect sharp upward changes in feed conversion efficiency by broilers, partly as a result of improved rations.

Signs of Emerging Progress

The average rate of feed conversion for all livestock production has changed little over the last 30 years or so. But this apparent stability represents an average of many divergent tendencies and trends for different kinds of production. Marked progress in some directions has been offset partly by diminishing returns and other considerations, leaving a net of little change.

Developments in commercial broiler production in recent years have resulted in substantial gains in efficiency of feed conversion. Between 1940–41 and 1953–54, the estimated national average feed consumption per pound of broiler produced decreased from 4.2 to 3.0 pounds. In terms of output per pound of feed this is an increase of about a third. Under experimental conditions broilers have been produced on less than 2 pounds of feed per pound of broiler. Some of this gain is attained through improved breeding and management, but innovations in feeds are responsible for much of it.

Signs are now accumulating that progress in animal technology may be speeding up. The phenomenal growth of the commercial broiler industry in recent years is an illustration of what may be in store. Advances in applied technology in the field of poultry production have been so dramatic and startling as to upset long established lines of valuation in animal husbandry circles. Poultry were once beyond the livestock pale in a twilight zone not considered as having full status. But in the latest edition of Morrisons's *Feeds and Feeding* (*5*), they were for the first time assigned a chapter.

Serendipity, Formula Feeds, and Progress

Careful historical analysis of the course of technological discovery and invention leads to the conclusion that much depends upon the unpredictable workings of the principle of serendipity.[2] Many of the basic discoveries or inventions are the unsought-for result of activities designed for other objectives.

Developments concomitant with the use of formula feeds represent one of the great avenues of progress in animal production. It is down this avenue that the princes of Serendip in the poultry world have been traveling, and the rest of us may well profit by their example.

Formula feeds manufactured by the commercial feed industry are certainly one of the keystones in the new feed technology. The industry had its beginnings early in this century, but did not become important until the 1920's. By 1939 about 12 million tons of prepared poultry and livestock feeds were manufactured annually, according to the census. This volume increased sharply during World War II and by 1954 was nearly 3 times as much as in 1939, or about 30 percent of the total of all grain and concentrates fed livestock. A large percentage of poultry and dairy feed now consists of formula feeds and the volume of formula feeds used for other kinds of livestock is increasing.

Formula feeds, and the technological changes that have come with them, have economic significance in several ways. They represent a transfer from farm to urban industry of an important part of the work and required knowledge in the preparation and compounding of livestock rations. Farm labor thus released is available for keeping more livestock or for other purposes. The benefits of scientific skill in formulating rations are available to anyone who can understand the label on a sack of feed.

Formula feeds permit the addition of supplementary substances to basic feeds under controlled conditions, so that specific feeds can be put together to meet special dietary needs. To a remarkable degree, good animal nutrition can be controlled by trained specialists instead of by random methods.

Feed Additives

The many substances that have come to be added to prepared formula feeds are sometimes referred to collectively as feed additives.[3] [4] They include minerals, vitamins, urea, hormones, antibiotics, and other growth factors or medications. They are an addition to the nutrients and substances carried naturally by the major feed ingredients in the mixtures. Additives are placed in rations in various combinations according to the kind of ration. Technical and economic effects have to be considered separately and in terms of the general effects of the whole clusters of innovations. A brief review of some of the individual items may be helpful.

Minerals like calcium and salt were among the first items to be added to concentrate feeds. Later other minerals including trace elements missing in feeds grown on certain soils were added to make up known deficiencies.

As *vitamins* were discovered and as research revealed their particular roles in the nutrition of animals in different types of production, they were also added to prepared feeds. Some vitamins overcame deficiencies leading to disease; others

[2] Serendipity is the gift or ability of finding valuable or agreeable things not sought for. The word was coined by Horace Walpole in allusion to the story of *The Three Princes of Serendip*, who in their travels were always finding, by chance or sagacity, things they did not seek.

[3] No definition of feed additives has proved acceptable to specialists in animal nutrition. The various nutrients micro-nutrients, and nonnutrients that are included under the term are usually added to the ration formula in very small quantities. They frequently increase feed efficiency greatly. Many of them occur naturally in certain feeds and in this sense are not additives.

[4] A recent review of feed additives is given in *Symposium on Medicated Feeds* (*8*), published this year.

merely made the animal stronger and more productive. Modern methods of poultry production in confinement became possible only as vitamin D was put into poultry rations.

Urea is a nitrogen compound that can be converted into the protein of microorganisms living in the rumen of the cow, the sheep, or the goat. The bodies of the microorganisms in turn provide protein for the ruminant. In this unique complementary process, the microorganisms must be provided with a source of feed energy also. A conventional expression for the relationship is that 1 pound of urea plus 6 pounds of grain will replace about 7 pounds of oilmeal containing 41 percent protein.

Sometimes urea makes it possible to utilize more low value roughages to supply part of the energy. It can be used to supply indirectly part of the protein needs of ruminants when price relationships make it profitable to do so. It thus becomes a cost-reducing substitute for protein. The cost of urea is a minor part of the cost of the total ration and the significant substitution relationship is between cost of the protein feed replaced by protein from bacteria, and cost of the carbohydrate feed needed to supply the energy for bacterial growth and for that contained in the replaced protein feed.

Urea is toxic in large quantities. Not more than a third of the total nitrogen in the diet should be in the form of urea. The quantity fed must be carefully controlled and thoroughly mixed, and most of the urea fed is supplied in formula feeds.

Antibiotics are among the more recent arrivals in formula feeds. Added in quantities below therapeutic levels they operate to prevent disease and subclinical conditions that impede assimilation of food and retard growth. The exact mechanism of operation is not as yet fully understood. Antibiotics serve to reduce death losses, and to increase output per unit of feed.

Antibiotics are now included in about 90 percent of commercially mixed poultry and turkey starter, grower, and broiler feeds, and in about half the layer and breeder feeds (*2*). They are included in about three-fourths of pig and hog formula feeds, but in only about 5 percent of dairy and beef formula feeds.

According to the National Research Council, antibiotics in rations of young pigs may increase the growth rate from 10 to 20 percent, and increase feed conversion efficiency by as much as 5 percent. Antibiotics reduce scouring and the proportion of runt pigs. The effect of the antibiotics is greatest where improved sanitation practices are lacking. Addition of antibiotics to creep-feeding rations may increase pig-weights by 5 to 10 pounds at 8 weeks of age. Preliminary research findings indicate that antibiotics may improve efficiency in feeding beef and dairy cattle and sheep. The value of antibiotics in rations for young dairy calves is well established.

Hormones are also recent arrivals. Much of the work with hormones is still experimental. *Stilbestrol* by implantation and *dienestrol diacetate* have been used in the production of caponettes for several years. But *stilbestrol* for beef cattle feeding is the one that has received most attention. Licensed by Food and Drug Administration for commercial use in November 1954, its use has spread rapidly and it has been estimated that as many as half the cattle on feed [5] in 1955 received rations containing it. Experiment station studies of beef cattle feeding show average savings attributable to stilbestrol of 10–15 percent in feed and an increase in average daily rate of gain of about a third of a pound a day. But to obtain equivalent grade and quality, stilbestrol-fed cattle must apparently be carried to heavier weights. Thus, the length of feeding period is not shortened and about the same total feed is consumed, but more beef per head is produced.

A few of the other common additives are listed below:

Arsenicals are sometimes added to poultry rations as growth stimulants. They are thought to benefit the animal in about the same way as antibiotics.

Antioxidants. These are chemical preservatives added to feeds to help conserve the fat-soluble vitamins and to retard the rancidity of added fats in the ration.

Surfactants, or *detergents*, are occasionally added to rations. It is thought they may have an effect similar to the antibiotics, or some physiological action that aids the digestive process.

[5] "Cattle on feed" refers to those cattle being fattened for market as a more or less distinct farm enterprise, and excludes small operations incidental to dairying or general farming as well as grass-fed cattle that are marketed without finishing. Grain-fed cattle comprise about a third of all mature cattle slaughtered.

Coccidiostats are often used in poultry rations to control the organisms causing coccidiosis.

Fats are sometimes added to rations as a source of energy. They also make feeds less dusty and enhance their appearance, texture, and palatability. At present about half the 4 to 5 percent fat in most commercial broiler rations comes from added grease or lard. The other half occurs naturally in other ingredients.

Amino acids. The supply of these essential constituents of proteins in the ration is often supplemented by animal proteins, fish meal, and vegetable proteins enriched with the synthetic amino acid methionine.

Unknown factors. There are unidentified factors that are important to nutrition, and whose action is not explainable at present. Three of these that are of recognized importance in poultry nutrition are the "whey factor," the "fish factor," and the "alfalfa factor." Various ingredients may be added to rations to supply these factors.

Effect of Additives on Production Relationships

In general, additives considered as a group influence the economic problem of feed resource management in two ways. The most important effect is the one characteristic of most innovations, that is, they cause a shift in the whole livestock production function. Output per unit of feed tends to increase all along the line. But they also influence the marginal rates of substitution between feeds. In this respect they have an effect somewhat similar to that of urea.

The substitution effect of additives is illustrated by an experimental test of prewar and present-day broiler rations (table 3). Use of additives has permitted the replacement of more expensive animal sources of protein by soybean meal, B_{12}, and methionine; and replacement of wheat by cheaper grains. Many other changes have been made. In this experiment, the improved ration alone has reduced the time needed to produce a 3-pound broiler by 1 week, and reduced the feed required from 10.26 pounds to 8.16. Yet, at 1954 prices, the ingredient cost of 100 pounds of the old ration was $6.12 compared with $6.00 for the superior present day one (*6*). Although the price of some of the additives is very high per unit of weight, the cost of the quantities used per ton of feed is very low because only spoonful quantities are necessary.

TABLE 3.—*Ingredients included in prewar and present-day rations compared in Beltsville tests*

Ingredients	Prewar ration	Present-day ration
	Percent	*Percent*
Carbohydrates:		
Ground corn	39.0	49.3
Ground wheat	22.0	.0
Protein:		
Soybean meal	.0	32.0
Meat meal	10.0	.0
Dried buttermilk	10.0	.0
Corn gluten meal	10.0	.0
Miscellaneous:		
Steamed bone meal	3.0	3.0
Ground limestone	.0	1.0
Salt [1]	.5	.5
Alfalfa meal	2.5	5.0
Dried brewers' yeast	2.0	.0
Vitamin A & D oil [2]	1.0	.3
"New" Ingredients: [3]		
Choline Hcl	.0	.1
Folic acid	.0	1.8 gm./ton
Lard	.0	4.0
DL-methionine [4]	.0	.1
Vitamin B–12 [supplement]	.0	.1
Fish solubles [5]	.0	4.0
Butyl fermentation solubles [6]	.0	.6
Crystalline chlortetracycline [7]	.0	18.0 gm./ton
3-nitro, 4 hydroxyphenylarsonic acid [8]	.0	45.0 gm./ton
Total	100.0	100.0
Analysis (calculated)		
Protein	19.6	20.6
Productive energy (calories per pound)	887.0	882.0
Fiber	3.0	4.6

[1] 96 parts NaCl; 4 parts $MnSO_4.4H_2O$.
[2] 1,200 A; 400 D.
[3] Ingredients added to the broiler diet since World War II.
[4] Methionine is an essential amino acid.
[5] Fish solubles are added to supply the "fish factor."
[6] Butyl fermentation solubles are added to supply riboflavin.
[7] Chlortetracycline is an antibiotic.
[8] 3-nitro, 4 hydroxyphenylarsonic acid is one of the arsenicals.
Reproduced from ARS Special Report, "Ingredients in the Modern Broiler Diet." (*6*)

Effects of Improved Feed Technology on Livestock Production

The foregoing brief description of several types of additives suggests a considerable diversity of individual effects on livestock production. Nearly all of them work toward more output per unit of feed. The extent of the immediate effect on output expansion differs considerably. For example, urea may simply permit substitution of

carbohydrates for proteins, whereas stilbestrol results in immediate increases in output from the same cattle.

A general view of the longer run economic effects of expanded use of formula feeds and the associated additives leads to a consideration of the following:

1. Further division of labor and shift of functions from farm to feed dealer and factory.
2. Interregional and interenterprise shifts.
3. Changing scale of operation.
4. Effect on total production of livestock.

The movement toward the use of more formula feeds, as with many other phases of technology applied to agriculture, means a shift of some functions from the farm to the city with accompanying advantages—and some disadvantages—of specialized effort. Just as in the classic illustration given by Adam Smith of the division of labor in the primitive pin factory, so here the division of labor makes for significant gains in efficiency and the development of special products not even possible before.

The commercial broiler enterprise owes much of its rapid development to the formula feed industry and the services associated with it, including managerial advice and credit. A recent South Carolina study showed that from a third to more than half of the farmers interviewed delegated to feed dealers important management decisions relating to choice of ration, choice of breed, when and to whom to sell, and what price to ask (*4*).

This delegation of part of the entrepreneurial function into fewer hands means that the special abilities of trained technicians can be obtained and focused more effectively on major problems. The practical elimination of large elements of risk and uncertainty means also that the producer can specialize, increase his scale of operations, and become generally more efficient in the conduct of the functions remaining within his sphere of decision and action.

Formerly the geographic location and distribution of livestock production was largely determined by the location of feed production. Even concentrate feeds were bulky and expensive to move as compared with the resulting livestock products. Consequently, comparative advantage was strongly tied to the location of feed production. This is still true with respect to the utilization of pasture and forage resources. But formula feeds have changed the situation with respect to concentrate feeds, and made them available everywhere at smaller regional and area price differentials.

Manufacturers of formula feeds are continually seeking to reduce costs of rations by substituting one feed for another as prices change and as technology improves. Expansion of the formula feeds industry will thus act as a stabilizing influence by tending to keep prices of alternative feeds more nearly in line with their marginal feed substitution values.[6]

With geographic differences in prices of concentrate feeds less marked, livestock production tends to gravitate more toward locations in which other resources are available on the most advantageous terms. This principle can be seen operating in the commercial broiler industry in which geographic concentrations of production appear to have developed initially around pools of underemployed labor resources (fig. 2). Once having commenced, other economies associated with the area integration of services for credit, supplies, baby chicks, and processing have developed in the same areas.

Some of the same advantages may have been important in explaining the location and growth of the fluid milk industry in certain areas in the Northeast, on the Pacific Coast, and elsewhere. Certainly formula feeds have played a part. Future location of cattle feeding and hog feeding operations may be influenced by the greater flexibility possible with improved formula feeds.

Scale of operations is obviously influenced by use of formula feeds and by some of the additives. The same labor force and the same overhead can produce more final product. Reduction in death losses in young animals means that more animals are carried to maturity. Savings in feed all along the line can be used to increase total livestock output per farm.

Competition between livestock enterprises may be affected in several ways. In general, innovations that increase the advantage of concentrate feeds more than roughage feeds will favor the animals that consume most concentrates. Poultry and hogs benefit more from these changes than

[6] For prices of competitive feeds to reach a new equilibrium after a change in the conditions of supply or demand, the ratios between prices must be inversely proportional to the marginal rates of substitution between the feeds.

402761—56——3

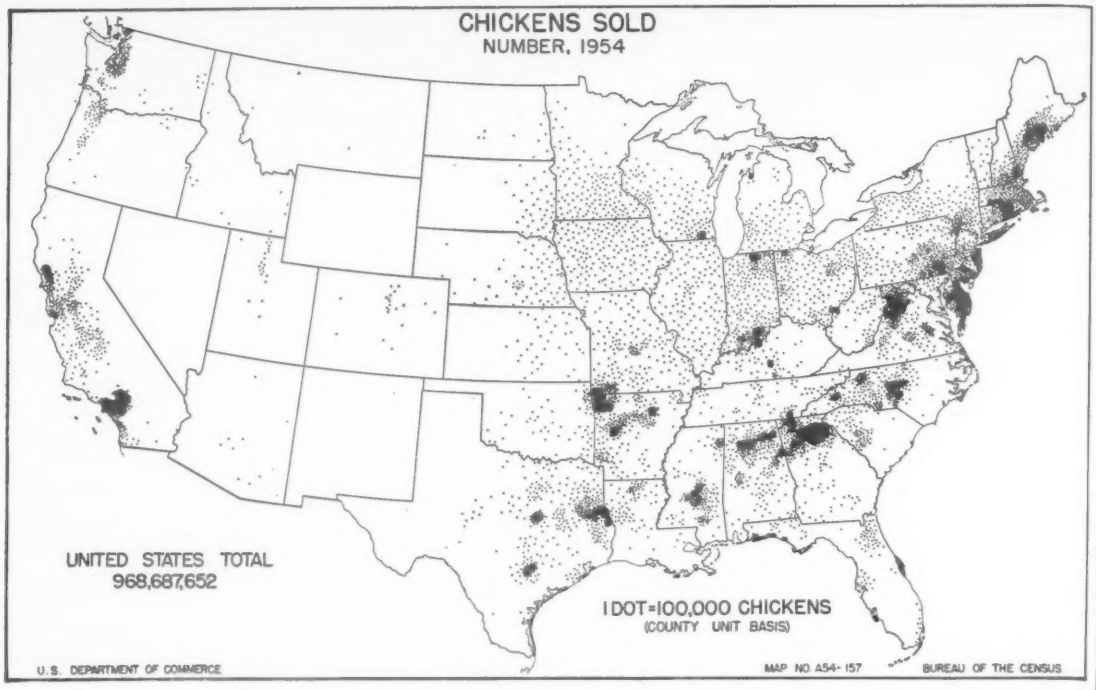


FIGURE 2.

do the roughage consuming animals. Poultry production has already been greatly affected; hogs may be next—the expected shift toward a meat-type hog may be accelerated.

Most feed improvements it appears will increase output on the individual farm and in the aggregate. Output-increasing innovations always raise the economic question of who gets the benefits. In the shortrun, those farmers who first adopt the innovation reduce their unit costs and increase output and profits. But as the new technique passes into general use, the aggregate expansion causes the price to decline. If the demand for the product is inelastic (usually so in the shortrun), the value of the total production will decline and farmers' incomes may actually be lower than before the advent of the new technology.

An additive like stilbestrol quickly put into use through formula feeds rapidly adds to output. Within about a year after it was licensed for feeding beef cattle, it was being fed to about half the beef cattle on feed in the United States. This indicates the speed with which an innovation can be accepted when the decision to adopt it needs to be made by only a few individuals—in this case the formula-feed makers. In contrast, the rate of adoption of hybrid seed corn depended upon the individual decisions of thousands of producers and it was at least 10 years after a successful hybrid became available before half the corn acreage in the Corn Belt was planted to hybrids. Of course there have also been improvements in the communication of new ideas since the advent of the corn hybrids.

The questions of the degree of elasticity of demand for livestock products and of the probable growth of demand over the next decade or so are therefore crucial. Merely to convert crop surpluses into livestock surpluses as a result of new technology might be of little ultimate help. The first effect, of course, may be helpful because livestock products use up several times the resources to produce as much total food nutrients, as do food crops.

Fortunately, continued growth of consumer demand appears assured by rising population. Elasticity of demand for livestock products is greater than for most crop products. Elasticity

of demand over time also appears to be greater than in the shortrun for at least certain of the major livestock items. Recent studies reported by Elmer Working (*9*), for example, indicate an overall long-time demand elasticity for all meats of about −1.2, more than unity. This contrasts with a relatively inelastic short-time demand elasticity of about −0.8.

Conclusion

This brief review of the state of technology in animal production suggests that after a long period of little change we may now be on the verge of a period of unusual progress that will be marked by increased efficiency in feed conversion. The role of feed additives is especially interesting because many of them do not raise an economic problem with respect to whether it pays to use them. The cost is usually minor and the production effects are often considerable. The physical or biological optimum rate of use is practically identical with the economic optimum.

But beyond the immediate effects lie significant economic consequences with respect to the organization of production on farms and the division of responsibility among farmers, dealers, financiers, and others who share in entrepreneurship. Important shifts in interregional and interenterprise location of production may be expected. The influence of technology on scale of operations and the general efficiency of livestock production will affect all phases of the industry. Livestock production will become more and more a manufacturing operation, geared to convert feedstuffs into food in the most efficient fashion. These changes will be helpful in shifting the balance between crops and livestock in the aggregate agricultural economy in the right direction.

Literature Cited

(1) Breimyer, Harold F.
1954. sources of our increasing food supply. Jour. Farm Econ. 36 (2) : 228–242.

(2) Brensike, V. John.
1956. use of antibiotics, other drugs, and vitamin B_{12} at low levels in formula feeds. U. S. Agr. Mktg. Serv., AMS–120. 18 pp. (Processed.)

(3) Hansen, Peter L. and Mighell, Ronald L.
1952. the economics of input-output relationships in feeding for egg production. U. S. Dept. Agr., Agr. Econ. Res. 4 (1) : 1–8.

(4) Miles, J. F., and Minchew, J. V.
1954. broiler production in south carolina. S. C. Agr. Expt. Sta. Bul. 415. 39 pp.

(5) Morrison, Frank B.
1949. feeds and feeding. Twenty-First edition. The Morrison Publishing Co., Ithaca, N. Y.

(6) U. S. Agricultural Research Service.
1956. ingredients in the modern broiler diet. ARS Special Report 22–25. 10 pp.

(7) U. S. Agricultural Research Service.
1956. changes in farm production and efficiency. ARS 43–33. 43 pp.

(8) Welch, Henry and Marti-Ibanez, Felix. Editors.
1956. symposium on medicated feeds. Medical Encyclopedia, Inc., New York, N. Y.

(9) Working, Elmer.
1954. demand for meat. Institute of Meat Packing, Univ. of Chicago, Chicago, Ill.

Livestock Estimates and the Search for Further Improvement

By Arnold V. Nordquist

In the following article is another of a series of progress reports published in Agricultural Economics Research *on the research program of the Agricultural Estimates Division, AMS, that is being conducted to develop more objective methods of obtaining data on trends in acreage, livestock numbers, and crop yields. This paper analyzes check surveys of livestock estimates recently made in the South and in the North Central States.*

THE CONTINUED UPSWING in cattle numbers and production in the face of record slaughter has created more than the usual interest in methods used by the United States Department of Agriculture in estimating livestock numbers. Even though the Census of Agriculture for 1954 substantiates the record level of cattle numbers on January 1, 1955, a broad interest in the methodology will persist as long as inventories and production remain at present levels, or continue to increase.

For the last few years a statistical research project has been exploring sample design and estimating methods in 10 Southern States.[1] This project has been pointed at livestock as well as crops. A general interest in the explorations of this research as it relates to livestock exists on the part of those engaged in producing or developing statistical data. Many users of statistical data are also interested in these new developments, and whether or not new and better estimating procedures and more accurate estimates will result.

Present estimating procedure can be briefly outlined. Most inventory estimates and some production estimates are based on periodic census enumerations, taken at 5-year intervals, which provide benchmarks by which to project annual estimates of yearly changes translated from annual surveys of livestock producers who provide information on their own holdings.

In this procedure, census totals are essential to the accuracy of estimates. They provide a basis for checking the level of past estimates, as well as for an accurate starting point. When the census is taken at some time other than January 1, it is necessary to ascertain changes in livestock numbers that occur between the census date and January 1, the date to which official estimates relate. At these times a special livestock survey is made to obtain information on these changes. For example, about January 1, 1955 more than 250,000 producers whose names were drawn in systematic sample from the 1954 census questionnaires were mailed a special livestock inquiry. Voluntary response from this inquiry, and a followup interview survey of nonrespondents to the mailed inquiry, provided information which the Department used to adjust the 1954 census, taken in October and November, to a January 1, 1955 basis.

If inventory estimates are to reflect properly the yearly trend in livestock numbers, they must relate to the same date every year. In some States the January 1 population of livestock may be different from an October inventory. Marked changes occur in location of feeder and migratory livestock and changes come about through births, deaths, and marketings.

How Livestock Survey Is Made

The main annual livestock survey is made as of December 1 each year. Rural mail carriers help to distribute—and to collect—livestock survey cards to thousands of producers along their routes. Direct mail is used to obtain voluntary reports on

[1] HENDRICKS, WALTER A., and HUDDLESTON, HAROLD F. A FOUNDATION FOR OBJECTIVE FORECASTS OF COTTON YIELDS. Agricultural Economics Research. 7: 108–111. 1955. VICKERY, RAYMOND E. AN APPRAISAL OF INTERVIEW PROCEDURES IN FARM SURVEYS. Agricultural Economics Research. 8: 59–65. 1956. HENDRICKS, WALTER A. VALIDITY OF OBJECTIVE ESTIMATES OF CORN YIELDS. Agricultural Economics Research. 7: 69–72. 1955.

sparse rural routes or in areas in which routes are lacking or not representative. The December 1 survey covers about 150,000 producers who report on their own holdings. Another survey made in all except the Western States early in January obtains 65,000 replies on the calf crop, farm slaughter, deaths, and several other items needed for making livestock production and income estimates. Western sheepmen receive a special inquiry on wool production, inventories, births, and disposition of sheep and lambs.

Considerable information is collected and analyzed for the purpose of checking the estimates. For example, current estimates are checked later, usually the following year, against trends in the number of livestock assessed in the 32 States that have such records. Taxation records provide a basis for evaluating the accuracy of the estimated year-to-year change in livestock numbers. During the present upswing in cattle numbers, taxation data are giving strong support for the annual increases shown in the estimates.

For many of the State estimates it is possible to use fairly complete records collected on marketings and slaughter, brand and health inspections, or railroad records, to arrive at an indicated change in inventories. Records of marketings, outshipments, and slaughter, and estimates of death loss during the year are subtracted from the totals of inshipments, births, and inventories at the beginning of the year to arrive at an indicated number on hand at the end of the year. Similar balance sheets can be developed on a national level, using imports and slaughter statistics.

Present operating methods, which employ mail surveys, rely heavily on regression analysis of relationship of selective sample indications of yearly changes to the official estimates of those changes, arrived at after census data, assessment records, and other check information have been used to establish the final official estimates of year-to-year change. So long as these relationships of mail sample data to official estimates hold true, current estimates of yearly changes can be expected to have errors about in line with the average, or possibly the range, for past years. It is when these relationships fail to run true to past form, or when fundamental assumptions in the analytical process turn out to be wrong, that estimating errors get larger and fall outside the range of past history.

More Objective Data Sought

In an effort to avoid problems associated with interpretations of mail samples, research work on sample design and estimating methods is directed toward obtaining more objective data on trends in acreage, crop yields, and livestock numbers. Interview surveys of probability area samples have been made periodically since 1954. In June of that year, a basic interview survey was conducted on a sample of 3,000 farms in 703 sample areas.

Segments covered 100 counties in 10 Southern States. The sample of counties was a probability sample selection according to type of farming. Sample segments in each county, drawn at random, had an average of about five farms. The procedure required all farms with headquarters in each sample segment to be covered by an interviewer. The June survey questionnaire included questions on cattle, hogs, sheep, and chicken inventories about June 1, along with questions on the calf and pig crops.

Estimates from the June 1, 1954 surveys can be compared directly with only a few official estimates. As no official estimate is prepared for June 1 inventories for cattle, all hogs, or sheep, direct comparisons of these items could not be made. But comparisons were possible with official estimates for farrowings, pigs saved, milk cows, and hens and pullets. For the inventories of cattle, hogs and sheep, an approximation of the June 1 number could be made, using the January 1 official estimates as a base, and records of livestock movements between January and June 1. The June 1 inventory numbers obtained from this approach are not too precise, but they will indicate whether estimates from sample data are within reasonable limits of the universe.

Some expanded estimates compare favorably with official estimates, others fall outside the range of sampling errors. The expanded estimates of spring farrowings and of hens and pullets were low in relation to the unrevised official estimates. This indicated that the original estimates of these items were somewhat high and, as it turned out, they were later reduced when revisions were made to the 1954 census benchmarks.

On the other hand, the sample expanded number of milk cows greatly exceeded the unrevised official estimate of June 1 milk cows. Official estimates of milk cows were revised downward,

increasing the discrepancy even further between the number indicated by the sample and the official estimates. The expanded number of all cattle exceeded by a fairly wide margin the official January 1 estimate converted to a June 1 number. Nonsampling errors were found to be rather important in this first survey. Some ineligible farms, according to later checks, were included in the sample, and some operations reported for land rented out to others.

A followup on the 1954 June survey was made by mail in December 1954 to obtain data that could be used in connection with the annual inventory estimates which relate to a January 1 date. The mailed survey approach included an interview followup on a sample of farmers who did not respond by mail. The data obtained were used to project the numbers indicated by the June sample to a January 1 basis.

In general, the estimate for cattle made by this approach held about the same relationship to the official January 1, 1955 estimate as that shown by comparisons of June 1 numbers. Thus, the procedures used appeared to measure rather accurately the changes in cattle inventories between June 1 and January 1. For hogs, however, the indicated January 1, 1955 number was larger than the official estimate for that date, in contrast with the June comparisons. This correctly pointed to the fact that original hog estimates in the 10 Southern States were too high. Why the approach measured the change for cattle but not for hogs was not evident. It may have been associated with lack of comparability on reporting by interview and by mail.

In June 1955, another interview survey was conducted in the same 10 Southern States. The sample design was similar to that for the 1954 survey, except that a large farm list of 1,000 operations was developed and enumerated separately. The introduction of a large farm list reduced the sampling errors appreciably.

Another innovation for the 1955 survey was the use of a "closed" segment approach in addition to the farm enumeration. Previous surveys were designed to include in the survey all farms whose "headquarters" fell inside the sample segments. If the farm headquarters fell inside the segment, all land operated as the farm was included even if some of it was outside the segment boundaries.

In addition to this procedure for June 1955, the interviewer obtained separate data on acreages and livestock for just the land inside the segment. Results of sample expansions generally show higher estimates from the "closed" segments than from those obtained from the total "open" segment survey. The closed segment approach may have introduced an upward bias; respondents in some instances tended to classify their livestock as present in the segment when they were actually outside segment boundaries. Greater care in making the field interview would eliminate this difficulty. Indicated numbers from the whole survey, however, showed fairly close agreement with official estimates projected to June 1 for all cattle and all hogs and for the January-May calf crop.

In December 1955, another mail interview survey was made in the sample segments to obtain changes in inventories between June 1 and January 1. The December surveys covered about 20 percent of the farms included in the June 1955 survey. Separate mail and interview samples were chosen. The mail inquiry sample was conducted in a fourth of the segments and the interview sample in an eighth of those covered in the June 1955 survey. Livestock estimates obtained from these surveys were based on percentage change from June shown by matched farms.

Although the procedures employed worked satisfactorily, indicating that these methods could be used within the framework of the time schedules for the livestock reports, both samples were too thin to provide dependable indications on the changes from June to January 1.

For 1956 the June survey was expanded into 11 North Central States, and Kentucky and Virginia. The survey in these States covered 458 segments in 224 counties. The sample in the Southern States was spread into 618 segments in 324 counties. The total sample in the Northern and Southern States thus covered about 1,100 segments in approximately 550 counties. As in 1955, both the "closed" and "open" segment approach were used in obtaining livestock data. Sampling errors in data from the closed segments were much smaller than those computed from the open segments.

Full evaluation of the results of this survey will soon be completed. Early results from the June survey were available to the Crop Reporting

Board in time to be considered in connection with midyear reports on crops and livestock.

Early results on livestock data were encouraging. Expanded totals from Corn Belt samples for most items appeared well within the sampling errors and fairly close to available check information. In general, check data on livestock are more dependable in these States than in the Southern States. They offer an "acid test" for the methodology as it fits that section of the country.

Still remaining is the problem of sampling for livestock under conditions experienced in the West. One of the next steps will be to learn whether the closed or the open segment sampling method will bring satisfactory results in that region.

Book Reviews

Traité d'Économie Rurale, vols. 1 and 2. By Jules Milhau. Presses Universitaires de France, Paris. 442 pages. 1954.

THE 90-DAY travail which Ph. D. candidates undergo to acquire the rudiments of a foreign language is generally regarded as a deference to classical notions of learning that yields no further advantage. The attitude is unfortunate. Foreign literature in agricultural economics surely has more to offer than to serve as grist for a declension and syntax mill. There is little occasion for smug confidence that foreign sources can add nothing to our own, even while granting that the volume of our own literature is overwhelming. This review frankly originated in routine pursuit of a passing grade in a language tool. That quest, aided by a professor's dictum that the work read be relevant to his field, not only brought the grade, but unearthed a refreshingly lucid pair of texts by a French agricultural economist, Jules Milhau.

Milhau's twin subjects are economic theory and economic policy in agriculture. These have received exhaustive treatment in this country, perhaps commanding as much lineage as the career of Marilyn Monroe. Milhau's contribution is, first, the meticulous attention he devotes to the peculiar nature of the economics of agriculture; second, his insistence that an understanding of those characteristics must precede any review of policy; and third, the complete and equal treatment he accords both theory and policy. This balance contrasts with a number of American studies that are notably unbalanced: those on economic theory of agriculture, in which a chapter or two on policy is added almost as a footnote; and those advocating a particular policy, with a small and selective bit of theory introduced as justification and as evidence of the author's learning.

Milhau is an anticlassicist where agriculture is concerned, and he is an empiricist. He insists emphatically that the economics of agriculture is not

a special application of classical economic theory but a subject field in its own right requiring specific treatment based on observation.

Reminiscent of T. W. Schultz, he deplores the inherent instability in agriculture. He differs from many American economists in that he stresses instability of supply a great deal more than that of demand, though his view may earn more sympathy in these days when United States farmers' prices and incomes are riding the roller coaster dips in spite of remarkably stable demand.

But Milhau goes further, describing the supply- and price-making forces in detail and distinguishing always between short- and long-run as well as intermediate periods. As would be expected, he dwells on price elasticity of demand commodity by commodity, discusses the shape of the derived total-value curve for each commodity, and considers the effect of relatively fixed farm-to-retail margins on elasticity at successive stages of marketing. On these matters, also, economists in the United States are entirely knowledgeable, yet inclined to take too much for granted. To what extent, for instance, did the current Soil Bank program originate in earlier erroneous estimates of elasticity of demand for livestock products—in overrating the capacity of that demand to absorb the products produced from acres diverted from wheat, cotton, and other allotment crops?

In his volume on policy the author names surplus supply as the most persistent of all problems. Dubbing as "Malthusian economics" the various measures for reducing supply, whether by production control or market diversion, he earns sympathy when he first admits his reservations on supply-control then concedes that natural instability in agriculture is so acute that some prudent action by government is unavoidable. He suggests briefly that if price supports are necessary they should be flexible and determined by a price board having a maximum of discretionary power.

But these views are of only incidental interest to us. More significant is his scheme of devoting correlative attention to theory and to policy, with a proficient and scholarly approach to both. He is ever reasoned, rational, reserved. To complete the alliteration he is also reconciled, for he concludes his second volume by observing that whether we like it or not the real world is departing farther and farther from the classical model—though the trend may arise in a search for more economic justice—and many of the changes are permanent ones that have to be reckoned with.

Proving that professors behave the same way the world over, Milhau developed his two volumes by the familiar mechanic of assembling notes from his classroom lectures. Further evidence of universality is the resulting flaw of imperfect integration, the breaks between lectures showing and professorial repetitiveness appearing too often.

M. Milhau is a gentleman of protean accomplishments. He is professor both on the faculty of law and in the national school of agriculture at Montpellier. He is a member of the National Economic Council of France, and member or chairman of several agricultural organizations. His published works date back to the mid-thirties. He is a farmer. And he is mayor of his home village of Causses-et-Veyran.

Harold F. Breimyer

Facts from Figures. By M. J. Moroney. A Pelican Book, Penquin Books, Inc. Baltimore, Maryland. 472 pages. Third Edition, 1956. 95 cents.

IF A LITTLE KNOWLEDGE be a dangerous thing, then it surely is fun to live dangerously. That is this reader's reaction to a perusal of this third and revised edition of Moroney's delightful book.

Common sense and simple arithmetic, the essence of statistics, are all that a busy administrator or a sophisticated statistician needs to enjoy it. They will not learn a great deal of statistics—neither the administrator, who thinks that because statistics is just applied common sense he already knows it, nor the statistician, who thinks that because he has studied and uses statistics, it is *necessarily* common sense. But if they can take a little hazing, both will get more than a few chuckles over Moroney's sobering remarks on the uses and abuses of statistics.

The author jolly well disposes of mathematicians who cannot find problems for their solutions, of statisticians who cannot dig up questions for their decision processes, of social, economic, and political indexers and fortune tellers who, though fearful of the stability of economic, political, and social structures, have not a worry in the world about the stability (or the importance) of their indices and forecasts, and of samplers who reject samples with excessive defectives because the samples are small but accept their testimony when their results are reasonably to be expected.

You hire a statistician to work out a sampling plan to give a certain desired protection in the most economical way. With a given sample size, he insists that any sample containing more than a single defective calls for rejection of the entire lot. As Moroney puts it, "You take the sample and are aghast to find two defectives . . . very disturbing . . . not so jolly. . . . 'Blow this for a game. Let's take another sample.'"

Though statistics are common sense they are not necessarily either obvious or common knowledge. The author stresses, by discussion and by example, what the statistician is trying to achieve with his techniques, and so creates on the part of his reader an appreciation for their need without attempting to insure mastery of their use. Their proper application is a complex business best left to experts. "It is easy to lay down the law," Moroney comments, "much less easy to know the meaning and effect of what you have said." The author presents statistics as an art in interpreting figures, never mistaking the intrinsic accuracy of the methods for a knowledge of the problem at hand.

The book touches upon a wide variety of statistical methods, from those occurring in the most elementary of texts—charts and graphs, averages, correlation—to more specialized tools ordinarily found in similarly specialized texts—variance and covariance analysis, methods of time series and ranking analysis, sampling and quality control techniques. The treatment is necessarily brief but sufficient to whet the appetite. An adequate bibliography is appended for those who wish to learn more. The section on sampling and related topics is more nearly adequately treated than any other.

Everyone, not excluding the index number fadists and the fortune tellers who come in for the least sympathetic treatment, will enjoy and profit from a reading of the book. The only faults I find with it are a rather large number of printing errors, considering the fact that this is the fourth printing, and the absence of warning as to the technical limitations of the methods discussed, a common defect in such an elementary treatise. But the Moroney paints with a wide brush; not many are going to err as a consequence of his inattention to detail. It would be difficult in these times to find more reading pleasure for 95 cents.

G. L. Burrows

Survey Design and Analysis: Principles, Cases and Procedures. By Herbert Hyman. The Free Press. Glencoe, Ill. 425 pages. 1955. $7.50.

REASONING has almost become a lost art in our present-day era of electronic computers and other "brain" machines, and thinking is deemed to be essentially unfashionable in a culture that prides itself on its anti-intellectualism and love of gadgetry. It is refreshing and heartening, therefore, to find a book on survey design and analysis which places its major emphasis on the rational procedures involved and which clearly demonstrates the significant extent to which the complex technical apparatus of survey research is dependent on the thought processes of the survey analyst.

Dr. Hyman's manual judiciously combines theoretical and practical considerations. The volume begins with a treatment of the institutional setting within which the analyst works and the problems that are the starting point of his inquiries. The main sections present the technical and theoretical principles involved in the analysis of both descriptive and explanatory surveys. Finally, there is a discussion of selected problems in the utilization of survey findings.

A particularly valuable feature of the manual is its brilliant exploitation of several concrete, illustrative cases. These include "The American Soldier," "The Kinsey Report," "Industrial Absenteeism," "The U. S. Strategic Bombing Surveys," "The Psychology of Social Classes," "The People Look at Radio," and "Public Opinion and the Atom Bomb." The discussion of the major critiques of several of these case studies assists considerably in sharpening the readers' critical faculties. The author's command of his material is impressive and his discriminating use of sources reveals a logical, orderly mind well prepared to address itself to significant intellectual problems.

The chief topics systematically reviewed by Dr. Hyman include: the precise definition of variables, the detection and control of error in the survey process, validation procedures, contamination of variables, time-order analysis, direct and indirect tests of relationships, spuriousness, and elaboration. Inevitably, some problems are treated better than others, and some, like replication, are scarcely touched on at all. It is unfortunate, for example, that the materials in Durkheim's "Suicide" are presented without reference to the follow-up study by Halbwachs. In addition to its value as a study in the differential analysis of the same source data, this would have been useful as a lesson in replication.

Addressed primarily to the relatively advanced student in social psychology and sociology, this remarkably well-written, thought-provoking manual for the training of students in survey analysis comes complete with problem exercises, solutions, and even, at extra cost, a special deck of IBM cards. Although written as a training aid, it should also prove valuable to experienced survey practitioners and social scientists generally.

Harry P. Alpert

The Changing American Market. First Edition. By the Editors of Fortune. Hanover House, New York. 304 pages. 1955. $4.50.

A REVELATION of how statistics can at once be made interesting and meaningful is contained in this venture in business journalism. Anyone who has recently visited a modern home show, an annual automobile show, a trade exposition, or even a supermarket hardly needs to be convinced that postwar market products or marketing methods are interesting. But one may need to read this book to realize how well the statistics behind sales and consumption can be brought together into a truly fascinating story.

The presentation is interesting both in the sense of being intriguing and in indicating the degree to which aggregate data, broken down and supplemented with sample survey data, can be woven into dramatic analyses. Of course the accompanying prose and graphic art are essential in achieving and holding interest. The accounts of where we were, where we are, and where we are going are sufficiently absorbing to overcome any nostalgic loss a statistically inclined economist might get from the almost complete absence of such phrases as "this table indicates . . ." or "figure Y shows . . . ."

The statistics are made meaningful primarily from the standpoint of business planning and decision. As the businessman reader will most likely be provoked to reflect on opportunities lost or be stimulated to think of opportunities ahead, the economist may be impressed with this illustration of the influence the profit motive will have in bringing about advances in social science analysis at much faster rates in the future. For example, the way desires, motives, and actions of native American women having millions more babies are dissected, examined, and measured suggests upward trends in pragmatic analysis for business purposes as well as in population. Similarly, the way segments of the market are related to buying potentials effectively reveals that the pursuit of added and redistributed income dollars is assuming scientific characteristics.

Old sayings to the effect that consumers' desires call the tune in the market place are not altered by this study, even though stress is placed on how much methods of production and distribution have changed. New methods by which the wants of consumers become known to the perceiving businessman are amply demonstrated. The result can be construed as a story of how ingenious analysts can gather and translate relevant statistical data for the corporate executive.

Chapters devoted to population growth, income distribution, and suburban market development as well as summary chapters on background and prospects justify the aim of the authors to present "an exciting new kind of travelogue for everyone interested in America." Assessment of the food market may hold more direct interest but no more fascination to many agriculturists than comparable chapters on houses, home goods, cars, clothes, recreation, and luxuries.

Prospects for increasing expenditures for food, although rated among the better pictures, hold no great hope for farm returns. The favorable conclusions rest heavily upon anticipated demands for higher quality and "built-in services." Although no attempt is made to segregate the food raw-material market from the market for associated services, the clear implication is that food-marketing margins will continue to rise. The much more exhaustive study of demand for farm products by Rex F. Daly reported in the July 1956 issue of *Agricultural Economics Research* lends further support to this view.

Optimism pervades the entire study, as might be expected since the book is drawn from 12 articles originally appearing in *Fortune* magazine. Considerable variation in degree of optimism with respect to different markets is evident, and the reasoned conclusions are conditioned here and there. In the aggregate, however, the predictions are portentious, suggesting that the economy will rise substantially by 1959, that it may be depression proof, and that no new developments comparable with the automobile, the radio, or television are in the immediate offing to bolster the economy. Neither are they needed, as they could affect only the degree of expansion.

Harry C. Trelogan

Economic Accounting. By John P. Powelson. McGraw-Hill Book Company, Inc., New York. 500 pages. 1955. $7.50.

ALTHOUGH DESCRIBED in a subtitle as "a textbook in accounting principles for students of economics and the liberal arts," this work is actually more than a mere textbook in accounting principles. It is an exceptionally fine presentation of relationships between (1) the social accounts, which have gained wide usage by economists and businessmen in recent years, and (2) the underlying business accounts from which they are derived.

The basic social accounts—national income and product, gross and net investment, flow of funds, and balance of payments—are explained and derived transaction-by-transaction. The approach is a model of clarity and completeness, using typical individual firm transactions, balance sheets, and profit and loss statements. Clearly outlined and explained are the differences between the aims, functions, and substance of social accounts, and those of typical business accounts prepared by accountants.

Any economist, even if he has little or no background in accounting principles and techniques can get from this book an appreciation and understanding of the social accounts. Agricultural economists, no less than economists in other specialized fields, will find that it contributes to a better understanding of the nature of the general economic forces that act upon the agricultural sector, and of the processes by which these forces bear upon agriculture. Farm sector income and product accounts have become increasingly useful and virtually indispensable in making broad appraisails of conditions in agriculture and in diagnosing many of the problems that beset it.

These farm sector income and product accounts serve also as useful adjuncts to other measures of agricultural activity and to other criteria by which determinations may be made of the economic status and progress of agriculture relative to other sectors of the economy.

With the extension of uses of social accounts into more and more fields of economic analysis, such an appreciation and understanding are prime requisites to useful, meaningful studies based on social accounting data.

The literature in economics in recent years has been replete with treatments of social accounting concepts, definitions, and analytical uses. These have been fine so far as they have gone, but some of the subtler aspects of social accounts have been largely neglected.

Two of these are (1) the elimination of certain interfirm and intersector transactions resulting from consolidations in the aggregating process and (2) eliminations resulting from the fundamental differences in the perspectives from which the economist and accountant view the economic processes. The author explains and illustrates these eliminations exceptionally well. His illustrations are extremely simple and his explanations are clear and adequate.

Robert H. Masucci

Yearbook of Food and Agricultural Statistics, 1955. Volume IX, Part 1, Production. Food and Agriculture Organization of the United Nations, Rome. 1956. $3.50.

THE NINTH EDITION of this valuable assemblage of world agricultural statistics contains a complete listing of data for 1954, the latest revisions of data for earlier years and, for the first time, a postwar average (1948–52) as well as a prewar average. The crops section contains new tables on tomatoes and pineapples.

While this volume is entitled "Production," there is more to it than the presentation of production data, by commodity, by country, although its major contribution is in this field. There is a group of food supply tables which have been arranged to show long-term trends in food consumption. The section on means of production contains data on consumption of fertilizers and pesticides and the number of tractors. The section on prices of agricultural commodities contains a new table for miscellaneous feedstuffs. And an entirely new section on wages and freight rates (maritime) has been added. All of the tables are elaborately footnoted.

Most of the data for the book come from questionnaires addressed by FAO to co-operating governments. With the improvement in the statistical services of the several countries, there has been a corresponding rise in both the quality and quantity of data offered in this useful reference work.

Part 2, "Trade," will be published within the next few months.

United Nations Statistical Yearbook, 1955. Prepared by the Statistical Office of the United Nations. Columbia University Press, New York. 1955. 644 pages. Paper, $6.00, cloth, $7.50.

THIS EDITION of the Statistical Yearbook, the seventh in the series, contains 183 tables, an appendix, and an index by subject and by country. The book is a statistical abstract of as much of the world as has statistics to offer—in this case 148 countries or territories. The time series presented are as nearly comparable internationally as available statistics permit, and the figures as a rule relate to territorial units within their present de facto boundaries.

Index numbers have been recalculated wherever possible to the base 1953=100, the period adopted for publications of the Statistical Office. Tables that appeared in previous issues of the Yearbook, but that are not included in the present edition, are noted in the table of contents. One item of particular interest is that the response of the USSR to the questionnaire sent out by the Statistical Office has made possible the inclusion of that country in the totals given in tables dealing with production of coal, crude petroleum, electric energy, cement, pig iron, and steel.

The tables are grouped under the following chapter headings: Population, Manpower, Agriculture, Forestry, Fishing, Industrial Production, Mining and Quarrying, Manufacturing, Construction, Electricity and Gas, Consumption, Transport, Communications, Internal Trade, External Trade, Balance of Payments, Wages and Prices, National Income, Finance, Public Finance, Social Statistics, and Education and Culture.

Selected Recent Research Publications in Agricultural Economics Issued by the United States Department of Agriculture and Cooperatively by the State Colleges [1]

ANDERSON, J. R. LAND USE AND DEVELOPMENT, SOUTHEASTERN COASTAL PLAIN. U. S. Dept. Agr. Inform. Bul. 154, 90 pp., illus. May 1956.

Presents land-capability and land use data for the Southeastern Coastal Plain. About 70 million acres are now in forests. Slightly less than 30 million acres are used for crops and pasture—less than half the land that is suitable for that purpose. With the agricultural supplies on hand and with other means available for increasing production when the need arises, the acreage developed in the next 20 to 25 years probably will be only 10 to 15 percent of that physically suitable for agricultural land use.

BEALE, C. L. CHARACTERISTICS OF FARM-OPERATOR HOUSEHOLDS BY NUMBER OF YOUNG CHILDREN. U. S. Agr. Mktg. Serv., AMS–118, 25 pp. June 1956.

Presents data on ratios of children to women of childbearing age in farm-operator households derived from a sample of 1950 census returns. The measure of fertility used is the number of children under 5 years old per 1,000 women 15 to 49 years old. Even though this "fertility ratio" is a measure of recent rather than lifetime fertility, it is a useful index of variation in family size among groups.

BELL, HUGH P. CONSUMERS' PREFERENCES AMONG BAKERS' WHITE BREADS OF DIFFERENT FORMULAS—A SURVEY IN ROCKFORD, ILL. U. S. Dept. Agr. Mktg. Res. Rept. 118, 53 pp., illus. May 1956.

Consumers who compared five kinds of white bread reported that they prefer the lighter, fluffier, breads, containing relatively high quantities of sugar and milk solids. They definitely preferred bread at 10 cubic inches to the ounce, over that at 7 cubic inches to the ounce. They preferred bread with a sucrose content of 7 percent over that with a content of 2 percent. And they preferred a 4 percent content of milk solids over bread with no milk solids.

BREAKIRON, P. L., WINSTON, J. R., KAUFMAN, J., and EARLE, C. B. CROSSWISE LOADING OF LONG-TYPE WATERMELONS. U. S. Dept. Agr. Mktg. Res. Rept. 133, 35 pp. illus. July 1956.

Loading the Congo variety of watermelons crosswise instead of lengthwise reduces more than 70 percent external bruising and cracking of melons during shipment. Total cost of watermelon damage in rail shipments has averaged well over 1.5 million dollars a year for several years. It is estimated that use of the new loading method for long-type melons only would save more than one-half million dollars a year.

[1] Processed reports are indicated as such. All others are printed. State publications may be obtained from the issuing agencies of the respective States.

EDGAR, A. D., GLAVES, A. H., AND HANSEN, J. C. AN IMPROVED ELEVATOR FOR DEEP BIN POTATO STORAGES. U. S. Dept. Agr. Mktg. Res. Rept. 131, 20 pp., illus. August 1956.

Less space and less power are required for a new elevator designed for moving potatoes from the lower to the upper floor of a 2-story potato storage and packing plant. The elevator causes little or no injury to the potatoes and can be used to regulate the flow of potatoes to the packing line for more efficient use of labor and equipment.

FORTENBERRY, A. J. CHARGES FOR GINNING COTTON, SEASONS 1947–48 TO 1954–55. U. S. Dept. Agr. Mktg. Res. Rept. 120, 47 pp., illus. June 1956.

Belt-wide average charges for ginning and wrapping a 500-pound bale of cotton progressively increased from $9 per bale in 1947–48 to $12.83 per bale in 1954–55. Region-wise, charges were lowest in the Southeast, where labor was less expensive, average investment in ginning facilities was lower, and practically all cotton was hand-picked. Charges were highest in the Southwest because of factors almost opposite to those in the Southeast.

GERRITY, M. V., AND JOHNSON, H. D. MOTORTRUCK TRANSPORTATION OF FRESHLY KILLED BEEF. U. S. Dept. Agr. Mktg. Res. Rept. 119, 40 pp., illus. June 1956.

Uniformly low air temperatures in refrigerated meat trucks can be obtained by using longitudinal aluminum meat-hanging rails or canvas air ducts over wooden crossbeams. Such temperatures help substantially in maintaining the quality of the beef.

GILLILAND, C. B., AND JACKSON, DONALD. TANK STORAGE OF FATS AND OILS AND MILL STORAGE OF OILSEEDS AND THEIR PRODUCTS. U. S. Dept. Agr. Mktg. Res. Rept. 122, 46 pp., illus. May 1956.

Storage facilities for fats and oils and for oilseeds and their products are adequate to take care of these products even in the years of heavy production. Tank-storage capacity for fats and oils in 1951 was estimated at 6.2 billion pounds, and total annual production of fats and oils (excluding butter) was about 12 billion pounds. At no time did stocks on hand require all the tank capacity available. Mill storage capacities for oilseeds and their products were adequate and generally well distributed among the various oilseeds.

GOODSELL, WYLIE D.; BROWN, W. HERBERT; FOWLER, HERBERT C.; HOLE, ERLING; HURD, EDGAR B.; VERMEER, JAMES; AND JENKINS, ISABEL. FARM COSTS AND RETURNS, 1955 (WITH COMPARISONS). COMMERCIAL FAMILY-OPERATED FARMS, BY TYPE AND LOCATION. U. S. Dept. Agr. Inform. Bul. 158, 62 pp., illus. June 1956.

This bulletin presents summary results of farm operations in 1955 on 27 important types and sizes of farms in major farming areas in the United States.

GRAY, JAMES R. SOUTHWESTERN SHEEP RANCHES—ORGANIZATION, COSTS, AND RETURNS, 1940–54. New Mexico Agr. Expt. Sta. Res. Rept. 7, 21 pp. May 1956. (Processed.)

In the 15-year period covered, sheep per ranch dropped from 1,425 to 1,105; land area per ranch increased from 13 to almost 20 sections, fleece weights increased 8 percent, and lamb marketing weights increased 5 percent. When moisture and range feed were good, improved management pushed net incomes to high levels. But range feed was only fair in 5 of the 15 years, and poor in an additional 5 years.

MANNY, ELSIE S. RURAL COMMUNITY ORGANIZATION—SELECTED ANNOTATED REFERENCES. U. S. Dept. Agr. Misc. Pub. 729, 124 pp. June 1956.

MATHIS, A. G., AND ANDERSON, E. D. YIELD OF NONFAT DRY MILK SOLIDS FROM A UNIT OF MILK. U. S. Dept. Agr. Mktg. Res. Rept. 126, 18 pp., illus. June 1956.

Yield of nonfat dry milk solids can be estimated from the butterfat content of the whole milk, when the test of the cream separated from the milk is known. On the average, each change of 1 percent in whole milk butterfat content is accompanied by a 0.4863 pound change in nonfat milk solids recovered from 100 pounds of liquid skim milk.

MCDONALD, EILEEN M., AND MCCOY, J. J. COSTS OF STORING RESERVE STOCKS OF WHEAT AT COUNTRY ELEVATORS AND ON FARMS IN KANSAS. U. S. Dept. Agr. Mktg. Res. Rept. 124, 31 pp., illus. June 1956.

Analyzes costs of storing reserve stocks of wheat in 22 representative reinforced concrete elevators in western Kansas, in 1,000- to 13,104-bushel round steel bins and in 25,000-bushel capacity quonset-type buildings. Reserve stocks, as defined here, refer to wheat that producers have delivered to the Government in satisfaction of loans under the price-support program. The wheat is a year old when delivered and may be stored 1 or more years under the reserve-stock program.

NORCROSS, H. C. CASH RECEIPTS FROM MAJOR FARM COMMODITIES BY STATES AS PERCENTAGE OF STATE TOTALS, 1924–55. U. S. Dept. Agr. Statis. Bul. 186, 51 pp., illus. May 1956.

Approximately 150 commodities now contribute to the total agricultural income of the country. About 30 of these items are included in the livestock category, and the rest are crops. No one State reports the sale of all of these commodities. The number tends to run larger in the West Coast States and Texas.

PILZ, E. J., BARRY, G., AND STOKES, D. R. NEW SHIPPING CONTAINERS FOR PLUMS. U. S. Dept. Agr. Mktg. Res. Rept. 128, 44 pp., illus. June 1956.

New shipping containers which permit substantial reductions in the cost of marketing fresh western plums have been developed and evaluated in a 4-year research program. The new containers are of fiberboard, and cost less than the 4-basket crate. They require less packing labor and cost less to load for rail shipment. Estimated potential savings with the new containers ranged from 19 to 30 cents a crate.

REESE, ROBERT B. SURVEY OF FRUIT USE BY PRESERVE MANUFACTURERS. U. S. Dept. Agr. Mktg. Res. Rept. 123, 43 pp., illus. June 1956.

Forty-six percent of the 300 million pounds of fruit used in commercially produced jams, jellies, and preserves in 1953 was frozen. Preservers located at a distance from fruit sources generally used frozen fruit, along with large percentages of canned pineapple, peaches, and apricots. From 1948 to 1953 production of commercial preserved products increased from 2.98 to 3.66 pounds per capita. The report estimates that by 1957 per capita consumption may be about 4 pounds a year, with 410 to 460 million pounds of fruit being used annually in 825 to 915 million pounds of commercially produced preserves, jams, and jellies.

SCOVILLE, O. J., ATHERTON, J. C.; ROGERS, R. O.; AND DAVIS, K. C. IRRIGATED FARMS IN A SUBHUMID COTTON AREA—INCOME POTENTIALS AND DEVELOPMENT PROBLEMS. U. S. Dept. Agr. Cir. 980, 80 pp., illus. May 1956.

The W. C. Austin Project, in the cotton and cash-grain farming area of southwestern Oklahoma, represents one of the first attempts to introduce irrigation of a project type in a subhumid area. This report analyzes the development of irrigated farms on the project, particularly in regard to improvements in farm practices, minimum size of farm needed for income and efficiency, integration of dry and irrigated land, and time to repay farm-development costs as affected by the changes in prices.

SNITZLER, JAMES R. IMPROVING THE TRUCK DELIVERY OPERATIONS OF A WHOLESALE GROCER—A CASE STUDY. U. S. Dept. Agr. Mktg. Res. Rept. 127, 51 pp., illus. June 1956.

This report analyzes the truck delivery operations of an independent Baltimore wholesale grocery firm. The study was made because problems of increasing costs in food handling and delivery operations are of concern to consumers and producers, as well as wholesalers. Suggestions were made for improved and more economical truck delivery methods and equipment.

STOCKER, FREDERICK D. GOVERNMENTAL COSTS IN AGRICULTURE—THE CONCEPT AND ITS MEASUREMENT. U. S. Agr. Res. Serv. ARS 43–28, 48 pp. May 1956.

Develops functional classification of agricultural programs of government (Federal, State, and local) and formulates method of measuring their cost.

THOMPSON, J. A., AND PERRY, J. S. STORAGE OF PEA BEANS IN MICHIGAN AND INDIANA. U. S.

Agr. Mktg. Serv. AMS–123, 78 pp., illus. May 1956.

Fat acidity values were found to be an indication of quality or a gage of impending deterioration at the temperatures normally encountered in the spoilage of beans in commercial storages. Deterioration of beans in storage depends on the combination of temperatures and relative humidity. At higher temperatures, lower relative humidities must be maintained for storage.

U. S. AGRICULTURAL RESEARCH SERVICE. CHANGES IN FARM PRODUCTION AND EFFICIENCY—1955 summary. U. S. Agr. Res. Serv. ARS 43–33, 43 pp. June 1955.

Production in 1955 was at a record high, as a result of record livestock production and the second largest crop production. Use of fertilizer and lime, production per breeding unit of livestock, and numbers of principal machines on farms, continued their upward trends. Increase in labor productivity in producing food grains has been greater than for any other group of enterprises. About 5 times as much food grains are now produced with each hour of work as before World War I. During 1955, each farmworker in the United States produced enough food, fiber, and tobacco to supply himself and almost 19 other persons. Farmworkers make up less than 5 percent of the total population. Of the 340 million acres of harvested crops, about 10.5 percent were used to produce products for export; 3 percent produced feed for horses and mules; and 86.5 percent produced food, fiber, and tobacco for domestic human use.

U. S. AGRICULTURAL RESEARCH SERVICE. HARVESTING HAY AND STRAW. U. S. Agr. Res. Serv. ARS 43–27, 19 pp. May 1956.

This report presents information on the methods used in harvesting hay and straw over a period of years when important changes in harvesting were taking place. The once dominant practice of handling and storing hay in long, loose form declined from 86 percent of the total crop in 1939 to only 20 percent in 1954. In 1954 about 73 percent of the crop was baled and about 7 percent was chopped.

Statistical Compilations

U. S. AGRICULTURAL MARKETING SERVICE. DAIRY AND POULTRY MARKET STATISTICS, 1955. U. S. Dept. Agr. Statis. Bul. 173, 96 pp. April 1956.

U. S. AGRICULTURAL MARKETING SERVICE. dairy statistics and related series. U. S. Dept. Agr. Statis. Bul. 134, 88 pp. Revised May 1956.

U. S. AGRICULTURAL MARKETING SERVICE. LIVESTOCK AND POULTRY INVENTORY, JANUARY 1—NUMBER, VALUE, AND CLASSES—BY STATES, 1940–54. U. S. Dept. Agr. Statis. Bul. 177, 117 pp. June 1956.

U. S. AGRICULTURAL MARKETING SERVICE. NAVAL STORES STATISTICS, 1900–1954. U. S. Dept. Agr. Statis. Bul. 181, 32 pp. June 1956.

U. S. AGRICULTURAL MARKETING SERVICE. PIG CROPS, BY STATES, 1930–54. SOWS FARROWING, PIGS PER LITTER, AND PIGS SAVED. U. S. Dept. Agr. Statis. Bul. 187, 63 pp. July 1956.

U. S. AGRICULTURAL MARKETING SERVICE. PRICES RECEIVED BY FARMERS, UNITED STATES, 1908–55. CROPS; LIVESTOCK; LIVESTOCK PRODUCTS; MONTHLY AND ANNUAL OR SEASON AVERAGE PRICES. U. S. Dept. Agr. Statis. Bul. 180, 47 pp., illus. June 1956.

U. S. AGRICULTURAL MARKETING SERVICE. TURKEYS—FARM PRODUCTION, DISPOSITION, CASH RECEIPTS, GROSS INCOME, BY STATES. REVISED ESTIMATES 1950–54, INCLUDING NUMBERS ON FARMS, JANUARY 1, 1951–55. U. S. Dept. Agr. Statis. Bul. 182, 15 pp. June 1956.

U. S. GOVERNMENT PRINTING OFFICE: 1956

AGRICULTURAL ECONOMICS RESEARCH

Is published quarterly by the Agricultural Marketing Service, U. S. Department of Agriculture. Use of funds for printing this publication approved by the Director of the Bureau of the Budget, Feb. 8, 1956.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 20 cents a single copy, 75 cents a year, domestic, $1 foreign.